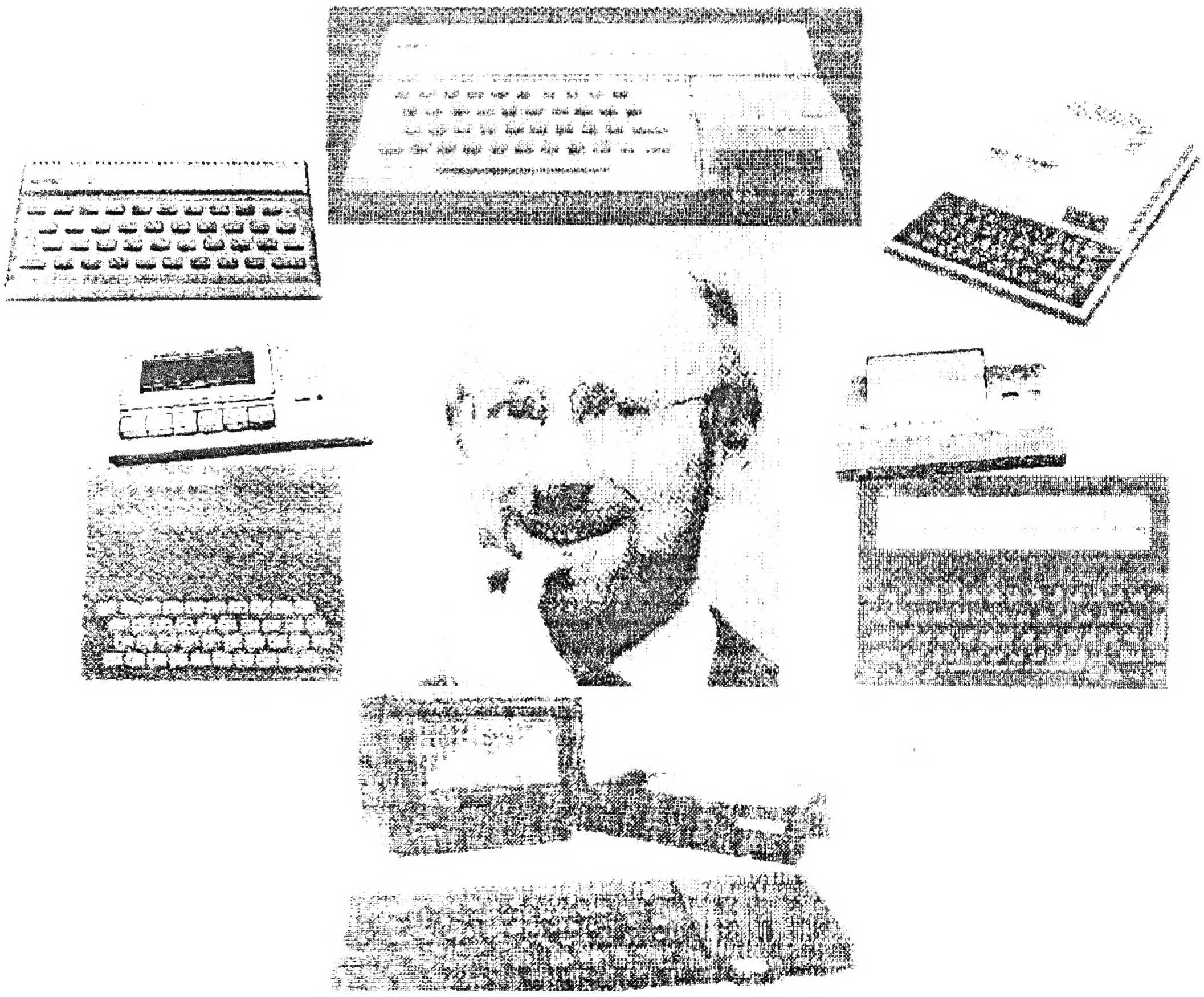
UPDATE!

THE FINAL ISSUE

COLLECTOR'S SPECIAL



UPDATE! MAGAZINE

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MEXICO, IN 46958 USA

UPDATE COMPUTER SYSTEMS is edited by Frank Davis and published by Carol Davis of **P.O. Box 17, Mexico, IN 46958 USA.** The phone number is **317-473-8031** for voice. **Normal hours are from 6 to 9 P.M. Tuesday thru Saturday.** Please use the answering machine if we are not available, and leave a short, concise message with both phone number and address. Most answers to questions left on the machine will be by mail, as long distance charges are too costly for a small magazine to be expected to bear **The phone number for faxing is 317-472-0783, and the hours for faxing are 7 P.M. thru 11 A.M. every day of the week.**

Mailing date of the magazine: all issues will try to be mailed out near the 20th of the months of October, January, April and July. All mailings within the USA are by bulk mail and may take a few weeks to reach you at the most. Those wishing to have faster service may pay $4 extra for First Class Mail. The present rate for North America is $20 in US$; and 18 pounds or 40 DM in European currency for a subscription. All issue years run from October to July of the next year, and those who subscribe during a year will get all issues for that year. In this way all subscriptions begin and end at the same time. Timely renewals are what keep us in business!

Assistance in publishing this magazine is provided by you the readers, many of whom have contributed news, articles and reviews. We offer you our heartfelt thanks. We are mainly assisted by our longtime friend, Eliad Wannum, Poet, Psychologist and Sinclair computer user. In addition, regular contributors have been: Bill Cable, Paul Holmgren, David Lassov, Al Feng, Don Lambert, Bob Swoger, Abed Kahale and Peter Hale, to name just a few. We invite you to submit material for publication to UPDATE MAGAZINE. Please make all hard copy (printed out) submissions Letter or NLQ; no draft print, or 2040 thermal print. The quality is too poor to print in a readable manner, and we do not have the time to re-type most articles. If you do not have a printer capable of this , then send the article on disk to us as: Z88, IBM, QL, TS2068 in Oliger or Larken, or in an Amiga file. We can handle these disk formats. We can use 5.25 or 3.5 disks in DSDD, HD, or ED densities. Send two copies of hard copy. Do not submit stuff on audio tape, as we no longer have any tape decks for the TS1000, or the TS2068. Try to avoid flowery or hard to read fonts, unless you are showing us sample output from a printer reviewed or a program. If artwork for an article is to be included, please let us know in what order you think it should be displayed.

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We hope to be of service to you. We do this magazine as a labor of love, not as a profit making business. Thank you for your support. All articles in UPDATE remain the intellectual property of their various authors.

Carol Davis

Frank Davis

Eliad Wannum

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The front cover for this edition was done courtesy of Abed Kahale of CATUG. Cover graphics are wanted for future issues. They can be in one of the following formats: JPEG, GIF or QL SCREEN.

We are now finishing our 9th year of publishing, and thank you for having been a subscriber. You can still send us articles and news for our new trial electronic version of UPDATE! On The Internet. Perhaps you will tell a friend to contact us about a sample of our upcoming electronic edition. An email address is needed.

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THE LAST HARDCOPY EDITORIAL *by Frank Davis, Editor*

Here we are with the long delayed, but delivered as promised last hardcopy issue of UPDATE MAGAZINE. It has been nine years that this magazine has been published. The first three years under the excellent tutelage of Bill Jones of Florida. The last six years have been done by my wife Carol and me with the excellent help of many. It has been a long time since I have heard from Bill Jones though I have continued to send him a copy of each issue since we took over. Knowing what I did of Bill I am sure that he has stayed busy in whatever area of life he has chosen. Thanks to you Bill Jones. Also my heartfelt thanks to all of those who have contributed over the years to articles and help with the magazine. Some, but not all of the names are: Eliad Wannum, Paul Holmgren, Bill Cable, Al Feng, Peter Hale, Bob Swoger, Abed Kahale, Mike Felerski, David Lassov, Bob Gilder, John Impellizzeri, Don Walterman, Bill Pedersen, Larry Crawford and a host of others. If I failed to say enough about all of you, or mention the help you have been, then forgive me and let it be known that all of the help was appreciated by Carol and me. This has been a very labor intensive work for us. We are now ready to take a rest from it.

Now is the time to once again mention that I will be trying, at least as an experiment, to put an online version of the magazine electronically on the Internet. To get a sample of this you will have to give me an email address that I can reach. This will work for those on the Internet, AOL, Compuserve, etc. If the response is good to this first issue, then I may offer it on a subscriber basis. If not, then so be it and so long and thanks for all the fish (hacked quotation from a book called the Hitchhikers Guide to the Universe.) Let me hear from you soon on this if you wish to participate.

I want to see as many of you as possible continue to use your Sinclairs and Z88s. To this mind, for support reasons, I do encourage all of you to become members of TSNUG and get their newsletter. Make this thing grow and contribute to it. If you need more information on them, check the back issues of UPDATE. I also want to see all of the QL users subscribe to QL TODAY, see the ad in this issue. This is what has tried to replace IQLR. I have seen two issues of this new magazine and to me it looks like a cross between UPDATE and IQLR in content and form. I do endorse this as it is a good blend of Europe and North America for the QL user. Hook up with these two publications and you will still see support for your computers. We still have a few fairly active users groups also. The NESQLUG group out of Boston is a great supporter of the QL, and for the full gambit of Sinclairs try the L.I.S.T. Group out of Long Island, CATUG out of the Chicago area, and the CATS group out of D.C.

I am not, at this time ending off entirely on supporting these computers. I am still pursuing FWD Computing, to provide some support for TS2068s, and a lot of software and hardware for the QL and Z88. This will be continued as long as there is sufficient demand for this service. When there is not enough stuff being ordered to make it minimally worth my while, this too shall end. This ball is in the court of you the users. Support me and I will support you. Please try to keep to the phone hours of the ads, and do not call and leave messages that you want me to call you back long distance. On some items the profit is only a few dollars and one phone call at my expense does away with any reason for me to stay in business. The burden of the phone call has to be on your shoulders. This is to keep prices down. Please take this in the kindest of ways. There are still some new items in the works for the Z88 and the QL. We have even seen some for the TS2068, such as Logicall Professional by Bob Swoger, and the reworking of MaxCom by Dave Lassov. Get active and make some new stuff, people, and support what you have left. This is what creates a future for new stuff. Piracy is what kills it, as well as indifference and lack of support from the users of a computer. In computers being the best is not what wins out; it really is the dollar bill that talks the loudest.

In this issue there is an article on how to expand the internal memory of your Z88. Do not attempt this unless you are familiar with the use of a soldering iron and desoldering. Get someone who feels confident in doing this. In order to make full use of this extra memory you should have the new ROM for the Z88 installed at that time. Check the ROM version of your Z88. It is probably version 2.2 or 3.0. The new version is version 4.0. It makes use of the extra INTERNAL 128K or 512K of memory, allows the Z88 to make better use of its memory by not fragmenting memory, and corrects the known operating system bugs. The new ROM is useless for these features if you do not have the expanded internal memory. It will not work with extra EXTERNAL memory. It must be internal. Also the price of the static RAM in the article has risen some since its writing. By now you are probably wondering "Where can I get this new ROM?" The answer is from FWD Computing, and we will also do the memory upgrade for you if you wish. Write, phone, or email me for details. This is not an overnight job for me to do, but I can do it for you, so be prepared to do without your Z88 for a week or so after you send it.

Most of you have noticed that we have put a lot of attention on the Internet in the last year, and you would be correct. Do not think that it is over your head to get into this, or that your Sinclair is not up to the task. Most people will try to tell you that you need an IBM or MAC computer running Microsoft Explorer or Netscape to access the Internet. It just is not true. I know of many QL users and a few Z88 users on the Net, as well as at least one person using his TS2068 (see the article on that in this issue). I have seen people using TI99s, Ataris, Commodore 64s and a lot of Amiga users as well as a lot of CPM and Unix machines on the NET. Some of you will decide to go the way of an IBM, but to me they just are not as much fun as I have had with my Sinclair over the years. It costs a fortune and a lot of heavy duty software to program today's IBM or MAC computers. There are however a lot of both cheap and very expensive software out there for them. You can easily wrap up a year's salary in a full blown IBM Pentium computer with all the knick knacks available for them, and take out a mortgage on the house to finance all of the nifty software to be had. Do that if you feel you must, but judging by the number of emulators written by IBM users to be able to emulate their old Sinclair computers I have to say a lot of people may not admit it in public, but they miss Sir Clive's little machines. Stay with the QL a bit longer and see some new miraculous hardware and software coming out in the next year. The machine is getting mature. Now is a good time to buy that backup for that TS1000, Z88, TS2068 or QL. Even a non-working one for parts is a good idea. I plan to still have mine working when they tell me that we have passed the year 2000. Just as antique cars have become many people's fancy, so too will older computers be in the future.

Paul Holmgren when I last saw him asked me to tell you that he still had a lot of Sinclair computers, parts, software and such that was in storage at the time of his house fire and that if anyone was interested in some of it to contact him. The best time is in the evenings or weekends, and if you do not get him, then keep trying. It is possible that by the time you read this they may have finished rebuilding his house and he will be back in it. I do hope so as it has been close to ten months or so, a long time to be in temporary quarters! His number is 317-291-6002.

For those who are interested in getting future FWD Computing catalogs via email on the Net, send me your email address. I am still working (when I have the spare time which is not very often) on a World Wide Web site for my business. It will be heavily devoted to the Sinclair computers with a bit of Amiga thrown in. For those who also have an Amiga I have the latest version of the QL emulator for the Amiga. It is much improved, and only lacks the use of the hard drive having part of it set aside for the QL emulator to use for its own. It is faster than a QL with a Trump card and nearly as fast as a Gold Card using QL. It comes on three disks and is available for $10.

With these words I end my last hard copy editorial. In the future I hope to find a bit of time to finish a couple of books, pen an article or two for TSNUG and for QL TODAY, etc. Thanks.

NESQLUG and The Fourth North American QL Show

On Saturday, May 18th of 1996 we found ourselves in Bedford, Massachusetts, just 15 miles NW of Boston. Carol and I had gone there for the QL Show at the Bedford Ramada Inn, 340 Great Road, Bedford, Massachusetts 01730. We had come for the show and were staying Friday and Saturday the 17th & 18th and leaving on Sunday.

Friday, 17 May most people met in the Ramada Lounge at 7PM (and onward till who knows when) and shared rides to the Willow Pond Restaurant, an informal pub in Concord. Carol and I arrived too late to go to this, but saw many of the dealers and attendees of the show later in the lounge at the hotel. Here for the first time I met Robin Barker in person, though I had done business with him before this. He is the man behind Di-Ren. They are the makers of the Amadeus System for the QL (most North American QL users have not yet realized just what all this has to offer!!), the Di-Ren Keyboard Interface and the Network Prover. He has also authored several war tactical games for the QL and the PC. He had arrived for the show, but his goods to sell had not. During the show I ended up loaning him some of his goods (that I also sell) so that he would have them to show to customers. He last told me that his stuff never did get recovered.

On Saturday, 18 May at 8:00 AM the doors to the meeting room on the 3rd floor of the Ramada opened to vendors so that we could set up our tables and opened to the public at 9:00. At noon the meeting room was closed for lunch break. At 1:00 - 4:30 the rest of the general meeting was conducted. This allowed us dealers to show and sell our goods. This gave us more time than we had in the last three QL shows. During the course of the show several of our European dealers gave talks, QBOX was demoed, and a new QL emulator that runs on the MAC computer was shown. If you are a dealer this is a very important time. From 4:30 - 5:00 the vendors removed equipment from the room. Numerous valuable QL hardware/software doorprizes were given away all day ! Turnout was good but not as large as I had hoped for. I thought that more of the D.C. area people would make it to the show, as for those of us in the Midwest, Boston and D.C. are like next door neighbors. I was very pleased to get a chance to talk to Peter Hale at this show as he and I are old friends. To be truthful, there was no one there that I was not glad to see. Carol and I have been active in the Sinclair computer scene in North America for many years and have become close to many people.

Saturday night was the QL Banquet. I am sure that a lot of work went into this, but I was disappointed by it. I ordered one of the two choices, but was told I had to have the other. It ended up being better than I expected in taste, but I still wish this had been handled differently.

Awards Presentation was done after the banquet and a wet bar was made available for those who wanted it. This was followed by a QL Quorum - a panel of our most knowledgeable volunteers. They answered questions from the floor and offered opinions on new software, IQLR, hardware in the works and problems people were having with hardware and software.

The evening ended with a folk song sing along, general discussions and elbow bending until they threw the stragglers out at midnight or thereabouts. Thanks to those who brought their instruments and to Al Boehm and Mary Boyle who led us in song. I really do think that our European friends really enjoyed this once it got going. It was fun.

Sunday at 9:00 AM was QLunch at the Boehms house in Bedford. We were told that several QLs and QXLs were set up in separate rooms for demos and discussions. We were sorry to have missed this but had already started the long trek back to Indiana. Since then we have been told that another show is in the planning in New York or Pennsylvania rumour says.

A Couple Of Simple ZX81 / Timex 1000 Modifications

ZX81 16K RAM modification

Parts:

62256-12 32Kx8 SRAM 120ns you can use low-power, this is a common SRAM lots of versions exist.
approx 12" of small gauge hookup wire

Procedure:

Remove the 2K SRAM (this mod is for single SRAM one socket ZX81s).
Bend out pins 1,2,23 on the 32K SRAM chip.
Install 32K SRAM in 2K socket, pins 1,2,27,28 will not be in the socket but will be located over the solderpads (holes) on the PCB.
Solder a small wire from pin 28 to the hole 28 (5V) & pin 27 to hole 27 (/WR) on the PCB.
Solder a short wire from pin 23 to anode (no band) on D1 (A11) located above the large keyboard connector on the lower right-hand side of the ZX81 PCB. Solder another wire from pin 1 to anode on D3 (A12), and lastly a wire from pin 2 to D5 (A13).

Diodes D1 to D8 are located directly above the large keyboard connector and to the right of R43-47

Notes:

Although you use a 32K RAM the ZX81 A14 is tied to VCC as the memory map only allows 16K to be used. The SRAM draws alot less power than the 16K external DRAM and is far more reliable.

ZX81 Composite video buffer

Parts:

RCA socket, 2N2222A transistor, 100ohm 1/4watt resistor.

Procedure:

Remove the RF modulator (use a high heat soldering iron on the Gnd plane).
For my US unit connect the 2N2222A as follows (there are 6 holes where the modulator was connected, from left to right 1=Gnd, 2=UK video?, 3=US video, 4&5 = 5V, 6=SW1 {channel 3-4}). The base of the 2N2222A to pin 3, collector to 5V & emitter to 100ohm resistor & RCA video jack center pin.
The other side of the 100ohm resistor connects to Gnd. Also Gnd the shell of the RCA jack.

```
          5V hole 3
            I
           / C
video hole 3-----O   B 2N2222A
           \ E
                  I------- video out RCA connector center
            I             RCA connector Shell GND
```

100ohm
|
Gnd hole 1

Notes:

Removing the RF modulator was the hardest part, you need alot of heat to soften the large Gnd case pins. Make a note of the position of the video connector on the modulator before you remove it, when you install the new RCA jack try to mount it so it lines up when the case is re-installed. It's a simple buffer but will drive a 75ohm load much better than no buffer at all and will protect the video circuitry on the ZX81.

PS currently working on two other and much more complex projects, just for the knowledge gained and fun of it.

1) An IBM PC keyboard to ZX81 (solders where the existing keyboard goes) using a single PIC microcontroller.

2) ZX81 to IBM PC tape record & play. Hooks up to the MIC & EAR connectors and to a PC printer port. Lets you fake a tape recorder and save files on your PC.

William Richardson wrichard@idirect.com

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SALE ON UPDATE BACK ISSUES

This is a very limited sale. Boxes of back issues of the magazine take up a lot of room. We need the room for other uses, and don't really want to send them to the land fill, so here is the offer.

You can get any four issues, except the current subscription year, for only $12 and this includes North American shipping. For other areas of the world add $2 for each four issues to cover extra postage. When you order give at least one alternative issue, as we may quickly run out of certain issues from years back. The first issue after we took over UPDATE was Oct.'90, so choose from then to the July '95 issue. Any left in a few months will be thrown out, so get them now, please. These will end up becoming collector's items in the future.

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2 - ZX81 Emulators.

Q: Are there any ZX81 emulators?

A: Yes. I'm aware of four at the moment. I'd rank them in the following order:

1. ZX81 Emulator - Atari ST. Free.
Programmer: Christoph Zwerschke.
FTP from: src.doc.ic.ac.uk /computing/systems/atari/umich/Emulators
Plusses: Runs at near exact speed.
Emulates FAST mode display. :-)
Joystick support.
Excellent file handling interface.
Minuses: No way to load original games from tape.
No HRG or sound.
No way to run at extremely fast speeds.

2. Xtender - IBM PC compatible. Shareware.
Programmer: Carlo Delhez.
FTP from: src.doc.ic.ac.uk /computing/systems/ibmpc/simtel/msdos/emulator
Plusses: Runs at adjustable speed.
Very fast on a 386/486/Pentium. 20 times faster on my machine.
Supports (limited) HRG.
Minuses: Arcane file handling.
Poor keyboard response.
No tape, printer or joystick support.

3. TS1000 - IBM PC compatible. Free.
Programmer: Jeff Vavasour
FTP from: src.doc.ic.ac.uk /computing/systems/ibmpc/simtel/msdos/emulator
Plusses: Emulates TS1000. The American version of the ZX81.
Minuses: Runs at uncontrollable speed.
Crashes with many snapshots saved on other emulators.
No tape support.
No HRG support.

4. Xtricator - Sinclair QL. Sorry, no information about this one.

In summary:

The Atari emulator is just about perfect for playing most games on, but due to the slow speed of the original, typing in long programs is a bit of a chore.

Xtender is good for typing in programs, because of it's high speed. However, due to the poor keyboard response, it's fairly useless for playing games that require simultaneous keypresses. Carlo Delhez (the programmer) is currently working on a new version of Xtender that will fix this problem.

TS1000 has no real advantages over either of the others, but might appeal to original Timex Sinclair owners.

Q: Where can I get software for the emulators?

A: There's some software on the ftp.nvg.unit.no site in the directory pub/sinclair/snaps/zx81. These are mostly BASIC programs, since there's no widely available method for loading in old tapes.

While you're there, check out my game: 'Deathrider.' :-)

You can also get a huge bundle of software if you register Xtender.

Finally, try picking up copies of all the emulators. Most of them come with a few examples.

Q: How can I get .81 files to work on Xtender?

A: Usually just rename them to have a .P file extension. The keyboard controls in games might not work properly though.

Q: How can I get .P files to work on the Atari Emulator?

A: Try renaming them to .81 files. They might be ones that were 'converted' to Xtender files by the above process. If that doesn't work, you can try the program PTO81 (from ftp.nvg.unit.no) which chops a byte off the end and fiddles a few system variables.

This is only available as a PC/DOS program at the moment. Contact me if you desperately need a ST executable version. Since the only compiled language I've got for my ST is STOS, I'm none too keen on writing one though.

Hi-Res graphics, programs that POKE the ROM (e.g. to change the speed in Xtender) or use Xtender's file handling system won't work, though.

Q: How can I load my old games off tape?

A: There's a program by John Elliot called ZX81TAP that is available on my ZX81 page (see above) that can, in theory, read ZX81 programs from tape, using a Spectrum Emulator and save them as P files to disk.

Unfortunately, I can't get it to work on my system, but this might be down to dodgy audio equipment, leads and a crap sound card. If anyone can get this program to work, I'd be very interested to hear from you.

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3 - ZX81 Hacking and Trivia.

Q: Could you get sound on a ZX81?

A: Yes. Just about, anyway. You could drive the cassette port rather like the ZX Spectrum's speaker. So if it was wired up to a cassette recorder or an Amplifier, you could get sound from it. There was a program, that was printed in a magazine, that could sample and replay sounds using the cassette port.

You could also get sound through the television, by rapidly alternating between FAST and SLOW modes. There was a 'Sinclair Organ' program in Sinclair Programs that did this quite nicely.

There was also the Zon-X add-on, that contained the AY-8192 sound chip (as used in the Atari ST, Spectrum 128 and Amstrad CPC machines) to create rather better sound effects.

At the moment, no emulators support ZX81 sound using any of these methods.

Q: Could you get hi-res graphics on a ZX81?

A: Yes. There were a number of ways.

1. The Z80's **i** register pointed to a font table. You could move this around in the ROM to create swirly graphics effects. The game Astral Convoy did this. Unfortunately, the design of the ZX81 made it impossible for the character set to be anywhere in the 16K range, so you couldn't have a user defined set without extra hardware. With a 64K RAM pack you could disable the ROM shadow between 8K and 16K and design your own UDGs.

2. CRL released a Hi-Res graphics toolkit. This contained an extremely hairy interrupt routine that replaced the ZX81's usual display update routine. Basically, it pointed the **i** register to a strategic ROM location, and tried to 'best fit' the HRG display to what it could find in those locations. It also used a feature of the ZX81's hardware that allowed you to have 1 pixel height characters to improve it's chances.

You still could, at best, only have 128 different combinations out of the 256 possible ones. These were the 64 'characters' and their inverses. So this is really pseudo-HRG.

A number of games by Software Farm, including Hi-Res Invaders and Rocket Man, used this technique.

With a 64K RAM pack you could also, alter the font, allowing an even better chance of getting the characters you need. Some people made an alteration to their ZX81's internal wiring, so that the I register can point to the 16K RAM area, allowing them to do the same.

3. There were a number of hardware add-ons that worked with software similar to the above routines to allow UDG's and true-HRG. DK'Tronics and Quicksilva produced devices that worked with some of their games.

Q: Could you get colour graphics on a ZX81?

A: Yes, but not without extra hardware. Prism released an adaptor that required some soldering inside the machine. It got little attention, because the ZX Spectrum had been out for a while, and the ZX81 was on the way out.

Q: Could you really run a nuclear powerstation on a ZX81?

A: Well, Clive Sinclair said you could. Then again, he made some pretty outrageous claims about a lot of his products. I wouldn't give it much chance, since mine crashes about once every 2 hours without a RAM pack on, and once every thirty minutes with one. :-)

Q: Could a 1K ZX81 really play chess?

A: Yes, but not very well. 1K chess was released in 1982 by Artic Computing. It had no graphics and could only play white. Nonetheless, a marvel of programming skill to get a chess game into 1K

Credits:

Clive Sinclair for making the thing in the first place
Christoph Zwerschke for the ST emulator 'ZX81.'
Carlo Delhez for the PC emulator 'Xtender.'
Jeff Vavasour for the PC emulator 'TS1000.'
David Gonzales for sending me some ZX81 software.
Ian Collier for much discussion about ZX81 emulation, 1K chess and HRG
Chris Gill for the original ZX81 homepage.
Chris Owen for his Sinclair history page.
Marat Fayzullin for his emulation home page.
Arnt Gulbrandsen for the NVG archive site in Norway.
Bob Tinsley for transcribing the ZX81 manual.
John Elliot for the ZX81TAP program.
Everyone on comp.sys.sinclair. ...and anyone else I've forgotten for whatever reason. Sorry!

Final note:

This FAQ is in its very early days, so don't be surprised if some of the information is rather vague, and occasionally incorrect. This is due to it being largely composed of my memories from fourteen years ago, gossip from comp.sys.sinclair, rumours and speculations.

Please feel free to Email any corrections to me if you know better.

See you in comp.sys.sinclair,

Matt Barber
University Of Greenwich
Email: M.Barber@greenwich.ac.uk

From: Kevin Baker <krbaker@edge.net>

Subject: TS1500 memory mod

Date: Sat, 27 Jul 1996 23:08:53 -0700

The TS1500 internal RAM may be expanded to 32K! Timex had the forethought to multiplex all 16 address lines for the DRAM included in the '1500, and fully decoded the memory map. Unfortunately, the CAS signal for the DRAMs is normally only active for the 16-32K region. However, by taking RAMRM high (as with an external RAM pack), the internal memory is moved to the 32-48K region. By taking an appropriate combination of signals and dynamically switching RAMRM, you can have 32K RAM internally.

Step 1: Remove the 16K DRAMS (4116 ICs). Replace with sockets.

Step 2: Rewire the power connections. 64K DRAM chips only require 5V, not the +/-5 and 12V that 4116 require. This will also insure that a faulty switching supply doesn't kill your computer. Be careful that you don't cut off 5V from the other ICs.

Step 3: Run the 8th multiplexed address line. This is RA7, pin 43 on the logic array. This goes to pin 9 on the sockets.

Step 4: Populate all the sockets with 4164 64K DRAM chips.

Step 5: Since RAMRM needs to be switched dynamically, you will need to wire in a 74HC08 quad AND gate. You need to gate A15 with /M1 to get the multiplexed address correctly to the DRAM. Diagram below.

```
            |-------\
A15 ----------|        )
            | 74HC08   )---------- RAMRM
/M1 ----------|        )
            |-------/
```

Step 6: reassemble your computer. Be careful with those damn keyboard flex strips!

NOTE: I have tested this on my unit. It seems to work fine, but make this mod at your own risk. Your mileage may vary!

BTW, it seems the CONTROL input on the logic array can be pulled low to disable the entire logic array.

Kevin

comp.sys.sinclair

Sinclair ZX Spectrum micro-FAQ

v3.02 (June 10 1995)

You can find an up-to-date & fuller version of this document at the following World-Wide Web (WWW) address:

http://users.ox.ac.uk/~uzdm0006/Damien/speccy/faq.html

Please send your additions and corrections to the email address above.

As I am a university student and about to take a year out to go back to the real world this may be the last major update of the FAQ for some time. My university account will become defunct some time around September 1996, and I am unlikely to be able to read any mail after June 14th 1996, so email to the address listed above will probably bounce or remain unanswered. I should have a new address by September 1996; I will make a link available to the new address on the following web page:

http://users.ox.ac.uk/~uzdm0006/Damien/mail.html

==== FREQUENTLY ASKED QUESTIONS ====

1 Just what is this newsgroup for?
This group's charter (from its original formation in December 1993) is to provide a forum for the discussion of the various brainchildren of Sir Clive (born Clive Sinclair) and related computers such as the Jupiter Ace, TK and TS series', SAM Coupe and Thor, software, peripherals, emulators for them, programming them; playing those wonderful games (6031769, anyone?); and anything else which interests the Sinclair community. The group is not moderated.

In practice, most discussion is Spectrum-related, but there's a fair bit of SAM Coupe, QL, ZX-81, etc. chat as well. This FAQ only covers the Spectrum, other documents being available separately:
The QL FAQ at http://ww.uni-mainz.de/~roklein/ql
The SAM Coupe FAQ at http://www.soton.ac.uk/~tsp93/Coupe/FAQ.txt

2. Can I post binaries to this group?
NO! The word 'binaries' does *not* appear in the newsgroup title, and this is a subtle indication that posting binaries is going to make you very unpopular very quickly. Many people have to pay for net access, and you're costing them money if you post binaries, which are substantially larger than most posts. You may also cause news providers to stop carrying the group if binaries are seen to be posted in it. If you want to distribute something Sinclair-related, upload it to an FTP site or put it on a web page and post the *address* of the site.

3. Is there a Spectrum emulator for <whatever machine>?
Probably. See section II, Emulators, in the full version of the FAQ. It is split up by machine type, so you should be able to find one you can use. Currently emulators are available on IBM PC (DOS and Windows), Amiga, Atari ST/TT/Falcon, Acorn Archimedes, Apple Mac/PowerMac, UNIX/Linux and NeXT platforms.

4. Where can I find <whatever game>?
The game you're after is probably available somewhere on the net. The gopher server at gopher://gopher.nvg.unit.no enables you to search for games (web interface to it at http://www.nvg.unit.no/spectrum/search.html), but an even better way to search is to use Hynek Med's snapsearch engine, located on the web at http://drson.vse.cz/snapsearch.

Several CDs full of games can be had (but see question 6):

Speccy Sensations II: Warm Silence Software at:
http://www.comlab.ox.ac.uk/oucl/users/robin.watts/wss/index.html

Emulator Heaven:
Phone Mike Mee in the UK on (01745) 591704 after 6pm or write to "Anncott", Hylas Lane, Rhuddlan, Clwyd, LL18 5AG, UK or phone 'TortyFoo' also in the UK on (01922) 616324 (7pm-10pm Weekdays/ 10am-10pm Weekends) or email:
emulators@tortyfoo.demon.co.uk

If none of those turn up the game you're after, try asking on the newsgroup, or (shock) going to a second-hand shop and digging around in their boxes of old tapes.

5. Is it legal to use ZX-Spectrum ROM images?
Yes, it is. Amstrad, who owns the copyright for the ROMs, allows free distribution of ROMs for emulation purposes, although they often apply stipulations such as not charging money for software that includes these ROMs. They also allow free distribution of electronic versions of Spectrum hardware manuals.

6. Is it legal to use snapshots (i.e. games etc.)?
Formally, using snapshotted game without actually owning a copy of it on a tape is a *copyright violation*. Nevertheless, ZX-Spectrum games are not being sold any more and using snapshots doesn't harm copyright holders much, if you don't make profit from it and don't distribute snapshots on a large scale. Some companies definitely do not like to have their games distributed (e.g. Ultimate/Rare), whereas others have given explicit permission (e.g. Vortex). A list of such companies/individuals is at http://users.ox.ac.uk/~uzdm0006/Damien/speccy/permits.html.

7. I have the game I was after, but in a format my emulator can't load. How do I convert snapshots between various formats?
Most snapshots can be converted into one another using SPConv program

by Henk de Groot [hegr@ensae.ericsson.se] and myself. An MSDOS version of this program is supplied with the JPP emulator (source included), but is a rather old version. A more up to date version (v1.10) is available from the NVG FTP site: ftp://ftp.nvg.unit.no/pub/sinclair/utils/generic/spcnv110.zip

8. I've got a snapshot that won't load into Z80 - it just gives an error message saying 'plusdrom.bin not found' and exits to DOS. How can I get it to work?
The snapshot was saved by someone with a registered copy including +D emulation, in +D mode. The game doesn't actually *need* the +D ROM, so you can use DEMGT: ftp://ftp.nvg.unit.no/pub/sinclair/utils/generic/demgt.zip to modify the snapshot so it isn't in +D mode.

9. Where is/are <Spectrum programmer/personality>?
Get the full version of this FAQ, there's a section covering this sort of question.

10. Any good FTP/WWW sites I should look at?

Again, get the full version of this FAQ, or take a look around my own web site - http://users.ox.ac.uk/~uzdm0006/Damien/speccy - I have a good collection of Speccy links there.

11. Where is Sinclair Research now? Is Clive on email?
Sir Clive Sinclair is still the chairman; no email address is known for him (and if you were him and had one, wouldn't you keep it a secret from the slavering hordes of Speccy fans?!). You could try contacting MENSA; Clive is a member.

12. What the hell is a Spectrum?
The best home computer of all time. Came out in 1982 from Sinclair Research Ltd., and proceeded to capture the hearts and minds of millions of people. Based around a Z80 processor and utilising lots of neat tricks to keep the cost down, Clive (now Sir Clive) Sinclair effectively created the UK computer industry with his ZX80, ZX81 and ZX Spectrum. If you've never used one, get hold of an emulator and try out some of the classic games around (e.g. Jetpac) and see what *real* gameplay is about without needing 50 Mb of hard disk space and the type of processing power that interferes with military radar.

13. I have a question not covered here!
First, try the full version of the FAQ, which can be found at http://users.ox.ac.uk/~uzdm0006/Damien/speccy/faq.html or at the NVG FTP site; ftp://ftp.nvg.unit.no/pub/sinclair/docs/specfaq/specfaqt.zip (ASCII text) and ftp://ftp.nvg.unit.no/pub/sinclair/docs/specfaq/specfaqh.zip (HTML). There are also other sources of information; in particular, if the question is about a particular game, your first stops should be Stephen Smith's Speccy Games FAQ and Games Database at:
http://www.hermetica.com/technologia/sinclair/stevo/gamefaq.html and
http://www.hermetica.com/technologia/sinclair/stevo/gamedbs/gamedbs.html
If they don't help, welcome to the group, ask away!

From: Stephen Smith <stevo@jonlan.demon co.uk>
Newsgroups: comp.sys.sinclair
Subject: Re: Speccy Mailing lists...
Date. Tue, 28 May 1996 18:55:39 GMT

Are there any mailing-lists/e-zines/web-sites for the Spectrum followers?

From the Spectrum Game FAQ, here are a few to get you going.

1.ftp.ijs.si/pub/zx
2.ftp.nvg.unit.no/pub/sinclair
3 topkapi.cc.itu.edu.tr/pub/spectrum
4.ftp.dcc.uchile.cl/pub/OS/sinclair
5.ftp.polsl.gliwice.pl/.optical/4/a/ZXSpectrum/games
6.ftp.inf.tu-dresden.de/pub/zxspectrum
7.ftp.gui.uva.es/pub/sinclair
8.akira.uc3m.es/pub/sinclair
9.virgo/inesc.pt.pub/games/ZX
10.lst.informatik.uni-erlangen.de/incoming/kio/readme
11.ftp.gmd.de/if-archive
12.ftp.funet.fi/pub/misc/if-archive
13.ftp.sun.ac.za/pub/msdos/zx
14.oak.oakland.edu/pub/msdos/emulator
15.ftp.itu.edu.tr/pub/spectrum/
16.ftp.lanprojekt.cz/pub/sinclair/
17.fly.cc.fer.hr
18.relcom.eu.net/zx/gmf.html
19.osiris.sund.ac.uk/~ca4aba/games.html
20.www.cs.ucl.ac.uk/students/zcacbb1/spectrum/speccy.html
21.ftp://uhura.ijs.si/pub/zx
22.ftp://ftp.dcc.uchile.cl/pub/OS/sinclair
23.ftp://ftp.nvg.unit.no/pub/sinclair
24.ftp://virgo.inesc.pt/pub/games
25.ftp://ftp.itu.edu.tr/pub/systems/spectrum
26.ftp://ftp.inf.tu-dresden.de/pub/zxspectrum
27.ftp://ftp.inf.tu-dresden.de/pub/incoming/zxspectrum
28.ftp://ftp.gmd.de/if-archive
29.http://zx-museum.org.ru
30.http://www.islandia.is/~wooster
31.ftp://ftp.funet.fi/pub/misc/if-archive
32.ftp://ftp.sun.ac.za/pub/misc/sinclair
33.ftp://ftp.gui.uva.es/pub/sinclair
34.ftp://akira.uc3m.es/pub/sinclair
35.ftp://drson.vse.cz/pub/sinclair
36.ftp://ftp.polsl.gliwice.pl/pub/systems/ZXSpectrum
37.ftp://ftp.komkon.com/incoming/Spectrum
38.ftp://ftp.komkon.com/pub/Spectrum
39.ftp://lst.informatik.uni-erlangen.de/incoming/kio
40.ftp://lst.informatik.uni-erlangen.de/incoming/kio/readme

41.ftp://ftp.lanprojekt.cz/pub/sinclair
42.ftp://ftp.vse.cz/pub/386-unix/linux/system/emulators/spectrum
43.ftp://fly.cc.fer.hr/pub2/spectrum
44 ftp://maya.dei.unipd.it/pub/sinclair_QL
45.ftp://maya.dei.unipd.it/pub/sinclair_QL/spectrum
46.ftp://tardis.soc.staffs.ac.uk/pub/sinclair
47 ftp://wuarchive.wustl.edu/systems/sinclair
48 ftp://ftp.demon.co.uk/pub/emulators/spectrum
49 http://www.nvg.unit.no/spectrum/contents-a.html
50.http://www.comlab.ox.ac.uk/oucl/users/ian.collier/Spectrum/index.html
51 http //www.soton.ac.uk/~tsp93ma/Coupe/
52 http://www.maths.nott.ac.uk/personal/cpg/zx81/index_old.html/
53.http://www.gre.ac.uk/~bm10/zx81.html
54 http://spodbox.linux.org.uk/~majik/sinclair/
55 http://relcom.eu.net/zx/
56 http://www.islandia.is/wooster/
57.http://www.nvg.unit.no/spectrum/stevo/stevowww/stevowww.htm
58.http://www.cs.bham.ac.uk/~dmb/speccy/
59.http://ireland.iol.ie/~sjones/
60.http://www.hermetica.com/technologia/sinclair/stevo/gamedbs/gamedbs.html
61.http://www.cs.ucl.ac.uk/students/zcacbb1/spectrum/speccy.html
62.http://jumper.mcc.ac.uk:80/~simonc/
63.http://www.il.ft.hse.nl/~ben/sinclair/sinclair.html
64.http://www.freeflight.com/fms/Z80
65.http://lia01.unizar.es/curro/spectrum.htm
66.http://osiris.sund.ac.uk/~ca4aba/snaps.html
67 http://drson.vse.cz/snapsearch/
68 http://www.soton.ac.uk/~rjc394/
69.http://spodbox.linux.org.uk/~blood/
70.http://sable.ox.ac.uk/~sjoh0132/
71.http://diana40.paisley.ac.uk/~com40014/index.html
72.http://paul.rutgers.edu/~savoiu/spectrum/
73.http://www.gatewest.net/~cpb/lom.html
74 http://www.ugr.es/~pedrom/sinclair.htm
75 gopher://gopher.nvg.unit.no
76.ftp://budda.tixm.tambov.ru/d/incoming/crems/speccy
77.ftp://spodbox.ehche.ac.uk/pub/users/majik
78.ftp://alba.easynet.co.uk
79.ftp://ftp.zx-museum.org.ru

--
Stephen Smith (stevo@jonlan.demon.co.uk) - Nothing REALLY matters.
Maintainer of SGD, Spec Game FAQ and MWS FAQ

http://www.hermetica.com/technologia/sinclair/stevo

Printing VU-CALC on a Large Printer

by Bob Swoger

One of the many wonderful things about the TS2068 is that there has been so much written to inform the user how to use all the features and capabilities. The manual for it is more informative than manuals I've seen for other brands. The way the memory is mapped makes programming a pleasure. The system ROM is located between 0 to 16383. The rest of space up to 65535 is RAM. Moving RAMTOP down to hide machine code is done by simply giving the command CLEAR followed by the address of the last byte of RAM you wish the computer to know about.

The TS2068 manual tells us that if we want to display something on the screen, we just POKE something into the RAM space between address 16384 (16 X 1024) and 23296 (16384 + 6912) or print something to one of 768 screen locations.

Because TASWORD TWO is more like a line editor than a word processor, every character and space displayed on the screen is stored in predictable RAM locations. With the use of HEADER.B1 by Nazir Pashtoon for tape and Disk Doctor by George Chambers we find that the start address for TASWORD documents 33280. This is the address of the first character on the top left most position on the screen.

If we do not enter printer controls into a TASWORD TWO document, the location of each character printed on paper and screen is easily located in RAM. If we want to see the text just entered into TASWORD TWO, we know to look for as much as 300 lines of 64 characters per line starting at address 33280 in RAM. Since 300 lines of 64 characters is 19200 bytes (300 * 64), the last character would be at address 52479 (33279 + 19200). The sixth character on the fifth line would be at location 33541 found by:

33279 + (4*64)+ 6 = 33541

The following short program will display the first 10 lines of a TASWORD TWO document named wpfile.Ct to the screen just as it appeared on the screen when you typed it into TASWORD in the 32 column mode:

```
10 RANDOMIZE USR 100: LOAD "wpfile.Ct" CODE 33280
20 FOR I=33280 to (33279+(10*64))
30 PRINT CHR$ PEEK I,
40 NEXT I
```

THIS WON'T WORK VERY WELL WITH MSCRIPT BECAUSE MSCRIPT LINES ARE OF INDETERMINATE LENGTH.

Now suppose you wanted to print out a portion of a VU-CALC spreadsheet to a large printer. Each VU-CALC cell is seven characters wide. There are 50 cells across. The address of the first character in the first cell is 34567. The address of the last character in the last cell in the first row is (34567 + (50 X 7)) or 34567 + 350. Since there are 50 rows, the last byte in the VU-CALC file is 50 * 350 or 17500 + 34567 or 52067.

As you can see, we can use simple calculations to locate where each byte of a VU-CALC file and each byte of a TASWORD TWO file resides in RAM. Armed with this knowledge, we can write a program to move VU-CALC cell information directly to a Large Printer or into a TASWORD TWO file for further formatting.

Since the large printer can print only 10 columns with reasonable left and right margins rather than all 50 columns across the page, VC2LP asks you to choose the left most column to be printed. It then prints that column and the next 9 and all 50 rows below.

TASWORD, being capable of 64 characters in a row, allows us to load 9 VU-CALC columns (9 X 7 = 63) into a TASWORD TWO file using VC2TAS. The added advantage of doing this before printing is that the file can now be modified further for better readability of the spreadsheet. Since many of our spreadsheet applications don't require all nine columns there is usually room to improve the appearance of the printout by moving the columns apart and using complete words for headings rather than being limited to 7 characters.

The two programs, VC2LP.B1 and VC2TAS.B1, are both provided as part of the LogiCall ensemble of programs available from Mechanical Affinity and RMG for $15, their listings are provided below.

Thanks to Marie Kendall for alerting this author of a bug in an earlier version of VC2LP.B1.

```
10 REM   --== VC2LP.B1 ==--
  WRITTEN BY ROBERT E. SWOGER
              1996 V1.4
20 REM  Prints VU-CALC files
         to a large printer.
30 CLEAR 34552: LET h=CODE "d"
: POKE 23658,0: POKE 23728,h
40 CLS : RANDOMIZE USR h: CAT
".Cv",
50 PRINT AT 16,0;'"This progra
m prints  9 columns &50 rows of
a  VU-CALC  file to alarge print
er.    You select theleft-most c
olumn.  You may Save,Quit or sel
ect drives 0-4 now."
60 INPUT "Name of file to prin
t? "; LINE g$
70 IF g$>="0" AND g$<="4" THEN
 RANDOMIZE USR h: GO TO VAL g$:
GO TO 40
 80 IF g$="s" OR g$="S" THEN GO
 TO 9990
 90 IF g$="q" OR g$="Q" THEN GO
 TO 9998
 100 RANDOMIZE USR h: LOAD g$+".
Cv"CODE
 110 IF PEEK 23728<>h THEN PAUSE
 h: GO TO 30
 120 REM R=VU-CALCs 50 ROWS
 130 REM C=VU-CALCs 9 clmn/pg
 140 REM V=VU-CALC doc start-1
 150 REM S=First column to print
 160 REM O=Offset to begin J
 170 LET R=50
 180 LET C=9
 190 LET V=34572
 200 REM Determine start column
 210 INPUT "Start with what colu
mn? ";S
 220 IF S<1 OR S>42 THEN GO TO 2
10
 230 LET O=(S-1)*7
 240 REM SET-UP LP driver
 250 RANDOMIZE USR h: OPEN #3,"L
P"
 260 RANDOMIZE USR h: POKE 16090
,72: REM Printer width
 270 RANDOMIZE USR h: POKE 16094
,8:  REM Left margin
 280 LPRINT
 290 REM PRINT VU-CALC TO LP
 300 FOR I=V+O TO (V+(50*350))-1
 STEP 350
 310 FOR J=1 TO 63
 320 LPRINT CHR$ PEEK (I+J);
 330 NEXT J
 340 LPRINT
 350 NEXT I
 360 GO TO 9998
9992 RANDOMIZE USR h: SAVE "VC2L
P.B1" LINE 10
9998 RANDOMIZE USR h: LOAD "L.B1
"
```

```
10 REM  --== VC2TAS.B1 ==--
  WRITTEN BY ROBERT E. SWOGER
              1996 V1.2
20 REM Converts VU-CALC files
         to TASWORD 2 files.
30 CLEAR 33279: LET h=CODE "d"
: POKE 23658,0: POKE 23728,h
40 CLS : RANDOMIZE USR h: CAT
".Cv",
50 PRINT '"This program create
s a  9 column50 row Tasword 2 fi
le from a VU-CALC file that can
be printed ona large printer.  Y
ou may selectthe left-most colum
n.    You maySave, Quit or selec
t drives 0-4."
60 INPUT "Name of file to conv
ert? "; LINE g$
70 IF g$>="0" AND g$<="4" THEN
 RANDOMIZE USR h: GO TO VAL g$:
GO TO 40
 80 IF g$="s" OR g$="S" THEN GO
 TO 9990
 90 IF g$="q" OR g$="Q" THEN GO
 TO 9998
 100 RANDOMIZE USR h: LOAD g$+".
Cv"CODE
 110 IF PEEK 23728<>h THEN PAUSE
 h: GO TO 30
 120 REM R=VU-CALCs 50 ROWS
 130 REM C=VU-CALCs 9 clmn/pg
 140 REM I=Tasword doc start
 150 REM J=VU-CALC doc start
 160 REM S=First column to print
 170 REM O=Offset to begin J
 180 LET R=50
 190 LET C=9
 200 LET I=33280
 210 LET J=34573
 220 REM Determine start column
 230 INPUT "Start with what colu
mn? ";S
 240 IF S<1 OR S>42 THEN GO TO 2
30
 250 LET O=(S-1)*7
 260 LET J=J+O
 270 REM MOVE VU-CALC TO TASWORD
 280 PRINT #0;TAB 12; FLASH 1;"W
ORKING";
 290 FOR K=1 TO R
 300 FOR L=0 TO (7*C)
 310 POKE (I+L),PEEK (J+L)
 320 NEXT L
 330 LET I=I+64
 340 LET J=J+350
 350 NEXT K
 360 RANDOMIZE USR h: SAVE g$+".
CT"CODE 33280,((7*C)+1)*R
 370 GO TO 9998
9992 RANDOMIZE USR h: SAVE "VC2T
AS.B1" LINE 30
9998 CLEAR 6E4: RANDOMIZE USR 10
0: LOAD "L.B1"
```

From: Bob Johnson
To: Sincnews@psg.com
Subj: At the keyboard
This is a special treat to post this, since I am typing away at this T/S 2068 keyboard. Yes, I am using Specterm-64 and have my 2050 modem modded into a serial port (RS-232) with a modem plugged into it. It is fun playing around with the emulators for old times sake, but folks this is the REAL DEAL!! I have every intention of keeping this system running into the next millinium and beyond. My setup includes two 800K drives with a Larken i/f, printer and serial ports, Kempston joystick port (part of the Larken card) and a couple custom ports I hacked into it, including a realtime clock. Okay, so I am being a bit of a showoff tonight, I will step off the soapbox and go now...

From: Bob Johnson
To: Fdavis@teak.holli.com
Subj: RE: AT THE KEYBOARD
If you are serious and really admire the fact that I have decided to keep the old machine alive, then I can send you a file in email that details what I have put into this system. This includes a custom loading screen. My "realtime clock" is one of those little stick-on clocks. I painted it silver and glued it over the center of the cart door. It looks like it is original equipment. It was inspired by having a Spouse who claimed I spent Too Much Time with my computer. I also have a Larken format shareware disk with some of my programs and SCREEN$. One of my most useful utilities is called Soundsmith. It is a program that uses color to display the sound chip registers so you can see which are related to each other. The contents of each register can be altered and the results can be heard. It is much superior to trying to type: SOUND 2,45;7,63;15,10;....and the alterations can be heard immediately. Anyway, if you are truly interested in this stuff, the ever shrinking community of keeping the real machines ALIVE, then let me know.

From: Bob Johnson
To: Fdavis@teak.holli.com
Subj: RE: AT THE KEYBOARD
I am attaching a GIF format picture of the T/S 2068 menu screen that I like to use. I determined that at the time about 90% of the time I used the computer I would use one of the programs shown on the menu. Fortunately, they all fit comfortably on an 800k disc, so I could insert the disc and power up. It would autoboot and present me with the menu. I would simply type the correct letter at the input prompt and it would whisk me into that program immediately. I have since updated the Mterm 2 and that selection is now Specterm-64. I also made the same type of disks for my sons, with their favorite software. One difference was that they had a menu that required them to type "writing", "drawing" or "games". Selecting games would result in another sub-menu with a list of available games, which must be typed in. Each boy had his own disc and didn't have to use the old man's disc. I wanted them to develop some

keyboarding familiarity while having fun.

This computer is still in operation, I used it to type that message the other night. I hinted at some custom hacks I have done. A simple one is that I brought the speaker signal to a jack at the rear of the case. The really elegant mod is that I brought the sound chip i/o port lines to a 9 pin connector at the rear. The SOUND command can read it as an input, or can output a byte, which is latched at the port until changed. Each line can directly drive an LED. Imagine the possibilities...

Let me know if the attached file makes the journey...

(Editors Note *I was never able to decode this file to see the picture, so I am including the next file which is of a similar bent - the effort to get computers like the Timex-Sinclair and the Spectrum onto the Internet on their own, not by means of an emulator or using an IBM to run Netscape, etc. I want to see them make it on their own. For those who do not know what TCP is.... it is the code used to allow a computer to be directly connected to the Internet, not via a terminal program or a BBS. This is for most folks the ideal way to do this. After this is accomplished you would still need a browser program to allow you to move around from place to place, as well as an email program to send and receive electronic mail. The ideas presented here are worth the time of some of you to check out. If I can be of help, drop me a letter or email. My time is limited, but I would like to help some. Frank Davis)*

From: Bill_McBrine <bmcbrine@pine.alberni.net>

Subject: Re: TCP/IP over a Z80 system

QUESTION

Hi there! Where could I look for TCP/IP, more specifically email details, and examples, to implement it in a non-PC environment, like say a Z80 based system?
Thanks in advance, My post didn't get out before I think.

ANSWER

You can get ROMable source code from comp.sources.unix archives. Look for "TinyTCP". It is a subset of the TCP commands, however. The IP part is easy, assuming you are using SLIP. There you go! TCP/IP that will probably run on a Z80! Just get a C compiler like small-c or zcc, and you should be flying in no time!

I'd like to hear what you plan on doing with TCP/IP on a Z80!! And if you get it running - Send me/us a line!!
TC,
=Bill=
* Bill McBrine #*# EMail: ragtag@freenet.alberni.net (other address pending)
Interests: Atari-8bit. Tandy 6000 (with 3.01.00) * bmcbrine@pine.alberni.net
Robotics. Linux. Amiga News. Networking. User-friendly Data-management Systems.
Jacques Villeneuve: Pole Position in first career Formula-1 Race! Finished 2nd!

From: rigter@cafe.net (wilf rigter)

Subject: ADD SERIAL PORT TO YOUR SINCLAIR

Date: 4 Aug 1996 05:09:16 GMT

Hello everyone,

It is time for another hardware project: this time a serial interface, for the ZX81, 2068 (and I believe the SPECTRUM). The design is fully hardware and software compatible with the popular TS2050 (TIMEX) modem. As usual, I tried to keep the circuit as simple as possible to make it easy to construct. I have build several of these units without problems. This interface is suitable for transferring files to and from your PC (and other computers). The hardware is self explanatory and easily constructed using point to point solder connections on a perforated PCB. To simulate a 2050, IO address 73 selects the data and address 77 the control register. Install 0.1uF capacitors between the power pins of each chip. I used a DB25 connector but DB9 connectors may also be used. Although the RS232 circuit is nonstandard, it works well over short distances (3m) : add a level converter if you like to meet the RS232 standard. To simplify connections to other computers, I have installed a jumper (J1) on the DB25 connector to tie CTS TO DSR and RTS leaving only the external connections for RX,TX and GND. The TX and RX lines of this I/F must be connected to the RX and TX lines respectively of the other unit. Someone may suggest different connector arrangements, optimized for other applications.
I use a simple ML (machine language) program to upload and download programs from the PC and I will post the program on NVG (a location on the Internet with what they claim is getting close to 3,000 Spectrum programs, as well as QL and ZX81 programs!). You may wish to use a communication program like ZXTERM80 with build-in XMODEM. If you have any suggestions please post them: feedback is vital for a project like this.

enjoy

wilf

Editors Note: *If this works with the above computers then there is no reason it should not work with the TS1500. What is needed now is software drivers for all of these computers to use it. Wilf has produced many such articles for newsletters and sinclair mags in the past and still seems to be going strong!*

TS 2050 MODEM COMPATIBLE SERIAL I/F

```
          74HC138          8251
+5V_____________________________________________________________
          _________  |     _________  |  +| 10uF
         |  VCC|16_|     |  VCC|26_|   ===
A5_____________1|A   |        |    |      |
A6_____________2|B  Y3|12_________11|CS    |      0V
A7_____________3|C    |  D0 ___27|D0    |              DB25/9
A3_____________4|E    |  D1 ___28|D1    |    74HC14
IORQ___________5|E    |  D2 ____1|D2  TXD|19__10_|\_9__[100]_____ 2/2
M1_____________6|E    |  D3 ____2|D     |    |/            TX
         |    |  D4 ____5|D4    |
         |    |  D5 ____6|D5    |    74HC14
         |_______|  D6 ____7|D6  RXD|3___5__/|_6__[10K]_____3/3
            8|   D7 ____8|D7    |    \|       |  RX
            0V        |    |            [1M]
RD_____________________________________13|RD    |              |____7/5
WR_____________________________________10|WR    |                GND
A2_____________________________________12|C/D   |
CLK____________________________________20|CLK   |
                      |    |
RESET_________1_|\_2_________________21|RST   |
         |/           |    |
      * 74HC14          |    |
                      |  DSR|24___ not used
   _________________        |    |
5V__16|  74HC4060  Q4|7---o    _25|RXC   |
0V___8|          |    \__|__9|TXC   |    74HC14
 |_12|RST       Q8|14--o      |  RTS|23___3_|\_4__[100]_____4/7
   |_________________|  ** S1   |    |    |/          RTS
    10|       |11          |    |
     |--[10M]--|           |  CTS|17__13_/|_12_[10K]_____5/8
     |       | XTAL =      |    |    \|       |  CTS
     |--]||[---| 4.912MHz    |    |   74HC14      [1M]
     |       |           |    |            |
   33 ===     === 33        |    |            0V
0V_______|__________|_________________4|VSS   |    74HC14
                      |  DSR|22__11_/|_10_[10K]_____6/6
                      |_______|    \|       |  DSR
 *  74HC14 PIN 14=5V PIN 7=0V                        [1M]
 **  S1 for BAUD rate selection                        |
    Q4=9600/1200  Q8=1200/300                         0V
```

Become A Sinclair Power User

by
Bob Swoger

In this present time of home computers no one computer seems to satisfy all the needs of many home computer users. A survey of the CATUG club members has shown that all have at lease two different computer platforms set up at their homes. This article is not about "Sinclair, the one and only computer you will ever need". Instead, it is about how to keep your Sinclair out of the closet by becoming a Sinclair Power User.

Our newest CATUG members have given us a clue to why some Sinclair computers serve their users well and others don't. One member has nearly all the hardware pieces, most of the essential software, and a neat setup. Another newer member has not yet gotten it all together. The answer lies in how complete those Sinclair computer setups are and how those setups are organized. In order for our Sinclair computers to serve us well the setup must be fast, complete in both hardware and software, and ready to go at all times!

Occasionally, I get to show my Sinclair set-up to visitors who use other computer platforms. Because their systems are classified as MAIN STREAM systems by todays current sales forces, they ask why my personal system continues to be the Sinclair. Only after they see my system in operation do they realize why I favor it above their particular platform. I have my Sinclair set up on a desk with a hutch. The hutch contains over sixty disk library cases each containing ten 5.25" disks.

The setup has all the essentials. Plugged into the Dock port of the TS2068 is the LarKen DOS cartridge with a LarKen Spectrum V2 EPROM. This EPROM gives me a perfectly functioning DELete key and on board RENUMBER utility for writing programs. Plugged into the back of the TS2068 is a LarKen 256K RAM DISK. In back of that is a LarKen DISK INTERFACE. Plugged into the interface are four 5.25" TEAC disk drives inside two housings which contain power supplies. Plugged into the Kemstone Joystick Interface is a Commodore 1351 compatible mouse. Behind the LarKen DISK INTERFACE is the TS2050 Anchor Modem. In back of the modem interface is an AERCO printer interface plugged into a 1 megabyte Printer Buffer. The Printer Buffer drives an NLQ Epson compatible graphics printer.

The Printer Buffer allows the computer to accept commands again two seconds after a print command! This means there is no waiting for the printer to print its many pages to continue using the computer again. Other computer platforms use software printer spoolers which slow those systems down or the users have to wait for a print job to end before they can use the computer again.

Of course, the key to speed for the TS2068 equipped with a LarKen disk interface is the LogiCall operating system. No more do I have to type RAND USR 100: GOTO 3 to point the system to disk drive 3 or RAND USR 100: CAT " ", to see the disk directory and RAND USR 100: LOAD "filenm.ex" to run a program. A simple '3' now points the system to disk drive 3, the CATalog comes up automatically, and the arrow keys highlight the program I want to enter. All the DOS keywords now work without the use of '*' or "/". [QL has an equivalent operating system from Platypus software called QLamber]

To contrast the difference between my Sinclair platform and what has been called a main stream platform, please picture what I have to go through it every morning at work:

Sit down in front of a Macintosh or IBM compatible system. Turn on the power. After about ten seconds, the screen lights up. The operating system is now loaded from a disk into RAM while you continue to wait. Messages and icons start appearing on the screen as the system initializes. A virus checking program automatically begins to run because the disk based operating system is vulnerable to being destroyed by viruses unlike our ROM based machines. Finally, a graphical interface begins to run and you finally see a blinking arrow beckoning you to click on some icon apparently designed for the functionally illiterate. Before the blinking cursor appears, you have enough time to go to the kitchen, pour a cup of coffee, and return to the computer! You now have to click on a few more icons and wait some more time to get the application on the screen.

I actually did all the following for the last Windows Possessed Turkey that suggested I "move up to a main stream system!" I took him to my Sinclair setup and powered up the system. When the screen became visible, a list of programs was already on the screen! [And, by the way, no fool has yet written a virus to wipe out your Sinclair's system ROM!]

I pressed W <ENTER> and the word processor menu was on the screen in seconds. L <ENTER> and a list of files to load was displayed. A few more quick keystrokes and the document was loaded and printing. When the document started printing I exited the word processor, entered the spread sheet and loaded in my tax records. I then sent that document to the printer while the printer was still printing out the word processor document. While waiting for the printer to get through, I showed him how we Sinclair people stay in touch by logging into the club BBS. The YOUNG man was blown away by the speed of it all.

There are certainly some things I can't do as well as the so called "main stream machines" do them. I can't play music from a CDROM and sound blaster while word processing like my daughter does. But my stereo sounds a whole heck of a lot better. I can't show scenery pictures on the screen either but I have a VCR that does that job. I can't do desk top publishing as fast as a main stream machine but my writings can be uploaded to those machines for further processing as this one was. I don't have a Hard Drive to store hundreds of programs but if you make one of your drives a QUAD DENSITY double sided 80 track drive and your machine is an 8 bit rather than a 16 or 32 bit machine, you will find that holding 100 programs on a single disk gives the feel of having a hard drive. The cost of conversion can be as low as $5.00.

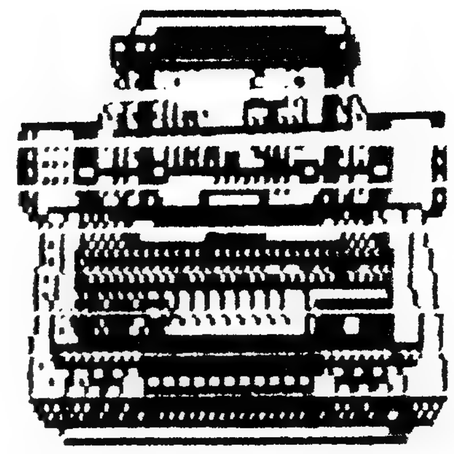
You do not have to be sucked into a high priced "Main Stream" platform by the promise of greater speed. For the things I do with my system, word processing, spread sheets, data management, the claim of speed using so called "main stream computers" escapes me.

I HAVE ALL THE NEEDED PIECES! Unfortunately, other members in my club are finding it increasingly harder to find all the hardware pieces they need to come up to the performance of my setup.

And now my message. To get the most out of your Sinclair system, you do have to have all the hardware pieces and all the necessary software! Read again the list in the third paragraph and try to obtain them all if you haven't already done so. After the magazines and newsletters are gone, you will need a modem to stay up with the latest Sinclair community events. Please get the missing items soon and enjoy the speed!

Many Sinclair related items including modems are still available from both FWD Computing and RMG Enterprises. Please call them real soon.

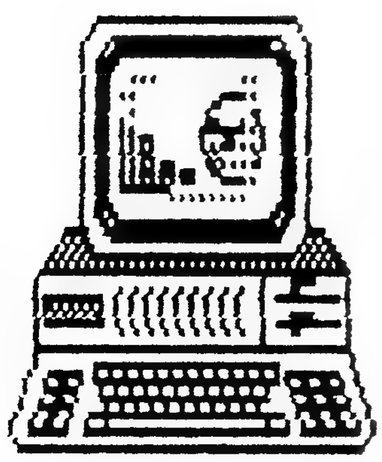
RMG ENTERPRISES



Supports Sinclair/Timex Users!

Send legal S.A.S.E. with request for price sheet. Specify model interest. Send $4 for GIANT GIFT catalog. (Includes ALL price lists) Phone or FAX for information on prices and availability.

Mail to:



14784 South Quail Grove Circle

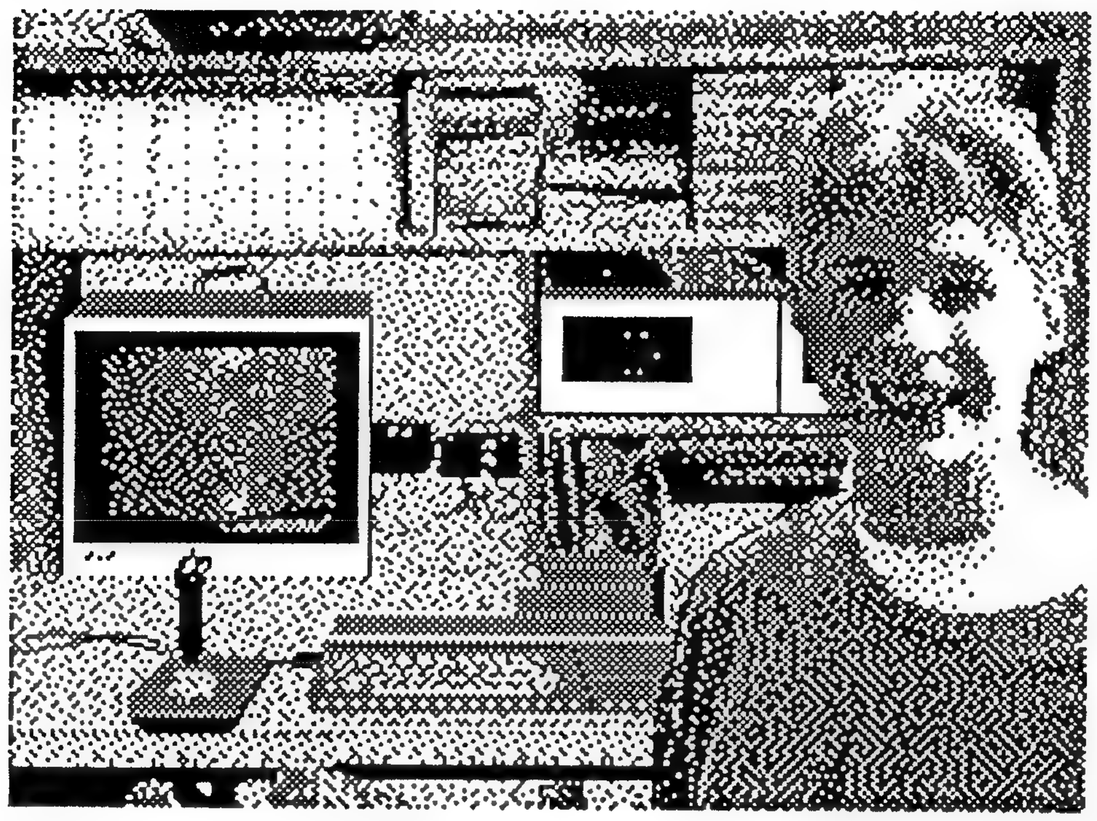
Oregon City, OR 97045

503/655-7484 * FAX 503/655-4116

TS2068 Key Top Protector

by

Phillip Kwitkowski



Our TS2068 users have long been concerned about the loss of the painted on key cap markings do to normal wear. We have tried carefully painting clear coatings on the keys using things like Krylon but in time that either wears off or collects finger dirt making the keys again unreadable.

Bob Swoger visited my home one day last winter and observing my TS2068, he noticed that my keys still looked like new! As he got closer, he found that he was looking at these keys through a thin, almost invisible film! "What's this?" he asked. "I got the idea from you. You know how you protect your home TV remote by wrapping it in a plastic sandwich bag? Well, I taped Saran Wrap over the top of my keyboard. You can hardly see it because the film is so clear and you can hardly feel it. Try it", I said.

He gave it a try. I had taped the Saran Wrap over the keyboard just lose enough to not feel its presence. The film started from under the cover of the game/dock port where it was fastened with two small pieces of Scotch tape. Unless you opened the door, you couldn't see the tape. I had laid a pencil vertically between the film and the keys and taped the left edge of the film under the TS2068 using several small pieces of tape. The ON/OFF switch was left uncovered.

The top edge of the film was left un-taped, its edge hidden by the groove just above the keyboard. The bottom edge was wrapped over the bottom edge of the machine and taped underneath again with several small pieces of tape. When the pencil was removed the tension of the film was relaxed making film limp over the keys. This is what made the film transparent to feel.

This whole procedure took far less time than painting clear Krylon coating over the keys and if the thing ever starts looking ugly, you can replace it again real easy!

Bob tried it on Bobby Muth's machine and his own at the next club meeting. Three minutes to find the scissors, pencil, Scotch tape and Reynolds version of Saran Wrap. Seven minutes to install the film and re-install the TS2068 back into the setup. Two minutes to put the items away again. (Wives/moms really appreciate that part.)

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From: rdzidlic@faui05f.informatik.uni-erlangen.de (Richard Zidlicky)
Subject: QL FAQ and Resources pointer, news on news
Message-ID: <RDZIDLIC.96May23181329@faui05f.informatik.uni-erlangen.de>

Hello Netters,
[sorry if this showed up twice due to a problem with our newsserver]
here is my small list of informations, links and addresses related to the QL.
I intend to post this regularly in comp.sys.sinclair and maus.sys.ql.int

This time with a revolutionary update to the usenet news section.

Email any comments, new sites and those I have forgotten to mention,
to ***rdzidlic@cip.informatik.uni-erlangen.de***

If you would like receive updates of this list by email, just email me.
##

The QL FAQ is maintained by Robert Klein, it contains lots of information about history and current developments, available and historic hardware, software, clubs, magazines and dealers.

Available from:
http://www.uni-mainz.de/~roklein/ql/
http://vzdmzi.zdv.uni-mainz.de/%7Ekleir000/index.html

Older versions are ftpable from maya and garbo, see below
The author can be reached by email as roklein@goofy.zdv.Uni-Mainz.de
##

The newest c68 version will be available from Thierry's WWW, sometimes
the version at **ftp.nvg.unit.no may be newer.**

Thierry Godefroy's home page, list of BBSs, WWWs, FTPs, QLCF BBS
c68 and some other software for download:
http://www.imaginet.fr/~godefroy/
http://www.imaginet.fr/~godefroy/english/index.html ENGLISH
http://www.imaginet.fr/~godefroy/download.html c68 download

##

Other known WWW addresses:

Timothy Swenson's WWW: (QHJ, other ezines, email lists, FreeWare)
http://www.serve.com/swensont/

Peta's QL Support Page, QTPI info and download, info about TFServices, Jonathan Hudson, Jochen Merz, many links, some software for downloading, Quo Vadis Page:
http://ourworld.compuserve.com/homepages/peta/

QLem Homepage, info and download. QLem is a QL emulator for Atari ST/TT
or STonX. STonX is an Atari ST emulator for unix/X
http://rand.thn.htu.se/~johan/

Di-Ren's homepage, product info, e-mail list, links, other QL traders,
QL Magazines info, QUBBESoft news, S.J.P.D overview & full catalog, for sale &wanted:
http://www.di-ren.co.uk/

Sin_QL_Air unofficial home page, meetings, info:
http://www.xs4all.nl/~wij2/sinqlair.html
http://www.xs4all.nl/~wij2/sinqlairuk.html **ENGLISH version**

Erling Jacobsen's Xchange page:
http://www.dk-online.dk/users/erlingj/xchange/index.htm

Marco Vacquier's home page:
http://www.xs4all.nl/~wij2/index.html

Arne's QL Seite (german only):
http://www.hrz.uni-bielefeld.de/hrz/person/runte/QL.html

68000 instruction set summary:
http://www.freeflight.com/fms/comp/CPUs/68000.txt
##

QL connectivity:

QLtools is a program for reading/writing/formatting QDOS DD/HD disk
on PCs Linux and nearly any other Unix.

QLtools v2.6 for Linux are available from Thierry's download page.
Version 2.2 with full source and compiled for Linux and MSDOS can be found at
ftp.nvg.unit.no pub/sinclair/ql/qltools*
##

ftp servers:
---

ftp.nvg.unit.no:pub/sinclair/ql/	c68, also mirrors maya
ftp.gui.uva.es	mirrors **ftp.nvg.unit.no sinclair area**
maya.dei.unipd.it:pub/sinclair_QL/	
garbo.uwasa.fi	

##

Usenet news:

---

newsgroups:

comp.sys.sinclair
maus.sys.ql.int general discussion about the QL
maus.sys.ql.c68-int news about the excellent c68 compiler
maus.sys.ql.ger german only

If you don't have access to the maus.* groups on your system don't despair - but they are worth to get them by any means.

Most sys/newsadmins will be cooperative if you mention that those groups are less than 100 articles a week, typically <<200 lines per article and no porn. Servers as far as in Thailand or Korea have them so it should not be a problem for your server.

If this does not work for you, after intense research of Ivan Dixon and me it is now possible to remote read this usenet groups using your favorite browser and post to them from any site using your favorite newsreader!

Posting to the maus.* groups

Just post to comp.sys.sinclair or something similar which is also carried in Germany AND crosspost to the wanted maus.* group. No need to use NNTP or Gopher servers.
However you should give a clear hint in the subject or first text line saying that this message is also crossposted to the maus.sys.ql group to avoid unnecessary cross-follow-ups.

GOPHER usenet access

Gopher has quick startup times and is really easy to use if used through some WWW browser (netscape,mosaic...) or xgopher; unfortunately it appears that this fine service will be completely displaced by WWW in the near future.

Some gopher news access sites in URL address format:

gopher://hp2.rz.uni-rostock.de:4320/1nntp%20ls%20maus.sys.ql%20
gopher://rnws04.urz.tu-dresden.de:7997/1nntp%20ls%20maus.sys.ql%20
gopher://gopher.uni-kl.de:70/1exec%3A-g%20maus%3A/News/.bin/gonntp
gopher://gopher.rrz.uni-koeln.de:2003/1nntp%20ls%20maus.sys.ql%20

In some cases the gopher server still offers some QL groups as they existed years ago, these are of course empty, just ignore them.

Some NNTP servers:

---

rznews.rrze.uni-erlangen.de
news.uni-stuttgart.de
news.rz.uni-hildesheim.de posting allowed !!!, but AFAIK works only with emacs GNUS,

	telent or rpent
news.ex.ac.uk	posting allowed, like hildesheim doesn't work with all newsreaders
news.coli.uni-sb.de	

Public newsservers are rare so don't abuse them to get large binary files!!
Try to configure your newsreader to retrieve only the relevant newsgroups!

To use one of the above servers try
setenv NNTPSERVER news.uni-stuttgart.de
and see whether your favorite newsreader supports this (tin may need -r option)

telneting works always, and also give best error reports, try
telnet news.uni-stuttgart.de 119 #type 'help' after login message

Emacs/Lemacs/Xemacs GNUS works with every server I have seen up to date,
type c-u meta-x gnus <enter> ,
now type the newsserver name and if it asks Subscribe all..

Also don't forget to have a separate .newsrc for each server; for emacs-gnus
just type 'touch .newsrc-SERVERNAME' from your shell, for other news readers
see the startup options or just **mv .newsrc-SERVERNAME .newsrc**

Bye
Richard

QHJ Freeware

What: QHJ Freeware is a freeware/sharware distribution service for North American QL Users. It is not designed to compete with European Freeware Distributors.

Why: It has recently dawned on me that there are no freeware distributers in North America. Due to currency exchanges, buying freeware from Europe can be a daunting and costly affair.

How: All Freeware packages are available as ZIP files. Check the list of files available, add up the total bytes, determine how many disks it would take, send the disks plus return postage. Return postage should be the same to send the disks to me.

To get the list of files available, send an SASE, an e-mail, or check my web pages. Addresses for all this are:

Timothy Swenson, 5615 Botkins Rd.
Huber Heights, OH 45424-4225
swensont@mail.serve.com
http://www.serve.com/swensont/

CABLE COLUMN

By Bill Cable

ARCHIVE SERIES
PART 25 : BACKUP STRATEGIES TO PREVENT DATA LOSS

This time we will look at how to prevent losing data from your ARCHIVE databases. We put a lot of effort getting data into database files and we can't afford to lose this work There are certain practices that can greatly reduce the chances of this happening and we will explore some of them now As I have already mentioned, this will be my final article in this series and the last article of this column. I wrote the first Cable Column in October of 1988 when Bill Jones was the publisher of UPDATE He thought up the name for the column and got me started. I have had my column in every UPDATE issue since. In July of 1990 I decided to do an extended series on ARCHIVE in the Cable Column It was a program I enjoyed working with and it seemed somewhat ignored QL users. I thought it deserved a second look. Sometime after that, Frank and Carol Davis took over the magazine and have provided a dependable home for this series ever since. No easy feat. The first Cable Column came out just after the Trump Card was released. It was an exciting time as we started to realize some of the potential of our orphaned computer. Nowadays a stock QL seems a little slow but back then it was memory and disk drives that held us back from taking advantage of the QL's multitasking operating system.

The Cable Column may end and perhaps other changes are in the wind but I doubt that the QL will fade into obscurity just yet. There there is still a hardcore group of users who are in it for the long haul. Some new developments both in hardware and software are in the pipeline to help us keep up with current technology. My main objective with the ARCHIVE series was to lay out, in some detail, the virtues of ARCHIVE and I have done that in 25 articles. I have compiled the complete set of 25 ARCHIVE articles into a book and disk called :

ARCHIVE MADE EASY

The Complete UPDATE ARCHIVE Series

It is available from FWD Computing (formerly Mechanical Affinity) I still consider ARCHIVE an excellent database system and this book makes a nice tutorial and reference book for anyone interested in ARCHIVE from beginner to advanced user I have done my best to share my knowledge with others Time constraints now limit my ability to produce articles on a regular basis but I still plan to be an active QL user and sometimes article writer. Writing articles is important to the QL community because when the supply of articles dries up and we stop sharing information, that is when the QL fades from sight.

DIFFERENT KINDS OF DATA LOSS

This article is a general discussion on data protection by using backups with a emphasis on ARCHIVE users. Those that have been following this series might well be writing sophisticated programs by now It is easy and important to make backing up an integral part of your programs When I talk about data loss I am taking about major loss. I am not worried if you lose a record or 2 because of a program bug. We are talking about major failures There are basically three types to consider :

1. A corrupted medium : This is a general kind of data loss that can happen with any computer system and does not depend upon the software used or file type. It can happen to floppy drive disks and hard disks. It is caused by some failure of the medium. The data stored on it can no longer be read. It can happen to an individual file if that is where the bad area is located or to the whole disk if that special area that keeps track of where things are on the disk goes bad. If just one or two files go bad you have a chance to recover most of the disk but if the directory area of the disk is corrupted you can't find any files on the disk. It is sometimes possible to recover data using special programs that can read the disk sector by sector but you would never want to rely on such a thing as a backup strategy. Only desperate people rely on such things.

When using ARCHIVE you will see the message "Incomplete file transfer" which is error 91 or error 102 when this type of error occurs. First you want to make sure that the disk is not full if you were doing something that was enlarging the space needed on the disk such as adding records to a database or copying a file there (the BACKUP command in ARCHIVE). From ARCHIVE you can use the DIR command to do a directory of the device and see the amount of free space left. If there is free space then there is a good change your disk is corrupted and you will have to deal with it. If the disk is full you still have a problem. If you were adding to a database then you can try to close it and exit but the database may be corrupted end up corrupted as described below.

To protect yourself from this type of error while using a database involves following just one simple rule : Backup your database whenever you change it enough so that you consider it an effort to reenter the information. Depending upon the database this might be after entering or changing 5 records or 20 records or 40 records. It is up to you to decide what an "effort" is.

2. Corrupted Database : This is the second kind of data loss that can happen while using an ARCHIVE database. This error is specific to ARCHIVE and is cause by the way ARCHIVE structures its data. When it happens you will see the message "Wrong file type" which is error 103. :

This is the famous corrupted database error that every beginning ARCHIVE users learns the hard way after spending a few hours entering data without backing it up and then promptly losing it. All ARCHIVE user must take precautions to prevent this error no matter how reliable their system. It happens when a database file is opened and a change command (INSERT, APPEND, ALTER, UPDATE, DELETE) is used and for whatever reason the file is not properly closed before ending the ARCHIVE session. When ARCHIVE has a database open and a change is made there is a flag set in the beginning of the database file which tells ARCHIVE the file has not been closed yet and its data is not complete. If ARCHIVE is not able to finish its changes then this flag never gets set back. The next time you try to access the file ARCHIVE refuses to acknowledge it as one of its own even though most of the data is there and perfectly okay. This is definitely a mean and nasty error but it is the price paid for having special features like variable length records. There have been attempts to get around this problem in several ways. One way is to reset the database file flag back with an editor so ARCHIVE will read the file but I found this unreliable and it ignores the fact that there may be some bad data in your database. There is also a commercial program (RECOVER) that will recover the good data in the database but it is very tedious to use and I found it unusable with large databases. You protect yourself against this problem just like you did for the corrupted medium discussed above, frequent backups.

There are several reasons why a database that has been changed does not get closed properly. Some you can control others you can't. If you QL locks up from time to time then it could lock up during one of these vulnerable times. Also the power could go off. Or you might be multitasking and forget that you have a database in a vulnerable state when you turn the power off. If you use the "CLOSE" or "QUIT" command the database is always properly closed and safe. If you just have a database accessed for "LOOK" then if is safe no matter what you might be doing. It is only when you use the "OPEN" command that you need to be very careful.

3. Lost RAM file - Unlike many other programs, ARCHIVE works with the data in its database. It is not loaded into RAM when accessed. But you can copy your database into RAM at start up and work with it there and then copy it back when done. This works quite well but you have to remember to copy it back from time to time if changes are made so you won't lose those changes if your QL locks up or power goes off. You never have to worry around corrupted databases if you use this method.

PROTECTION STRATEGIES

Naturally the more backups you make the less chance you will have in losing data. But making backups takes time and effort. There are several other things to do first. First never have a database "OPEN" more than necessary. Always "LOOK" at it until you have to "OPEN" it and then "CLOSE" it and "LOOK" at it when through making changes to it. It can become tedious to keep opening and closing it and there is another way. With my Financial program QLerk I never let the user make changes to the main database. Instead, I let the user do their work in a temporary Group file that has the same fields as the main database. If the user want to alter a record in the main database they first bring it into the group to work on it. To add a new record is easy as it can just be put in the group. Then when the user requests it, QLerk momentarily merges the changes into the main database. This has proved to be 100% effective because the main database is only vulnerable for a couple of seconds during merging.

I use two backup strategies for databases that use multiple files. First I make a complete backup of the disk from time to time depending how actively the data gets changed. This is done in ARCHIVE by coding the names of the files to be backed up into the program and making it an option. You can do it just as easily by regularly doing a WCOPY from SuperBASIC. You have to stop everything and wait for the backup to be completed. It is usually a good time to do something else for a while. The second type of backup, is to do a quick backup of the most recently changed database. I usually provide a menu option in the program to accomplish this task. Remember that you can't copy a database (using BACKUP) from within ARCHIVE while the database is being accessed. You must first "CLOSE" it, then use the "BACKUP" command to copy it and then access it again. Do the quick backup often and the complete backup from time to time.

WHAT TO DO IF YOU NEED YOUR BACKUP

When you lose a database file or any file the first thing to do is to take your most recent backup and make a copy of it and then use that copy to supply the missing file or files. Never, in your rush to get going again, use the backup itself. Remember you might not understand what caused the data loss in the first place and it might immediately happen again. If this is important data go very slowly and methodically.

Start with a fresh disk. Format it and put any files you can from the original on it. Next put the latest copy of each file you can't get from the original from your quick backups. If two databases are interrelated and your backups are from different times you make have to spend some time catching one up with the other. Usually there is a primary database that is most important and will be the one you quick backup most often. The secondary databases change much less often and you can get by with older version of them.

Happy ARCHIVE and may your backups always be freshly made and good luck!

AURORA
The QL Graphics Card
Flash News Release!!!!!

QUBBESoft P/D and Zeljko Nastasic (makers of QUBIDE & QPLANE) are going to produce a Graphics Card for the QL. The outline spec's for The Aurora are as follows:-
First of all it's going to be a QL motherboard replacement, with the following changes:

Things that will not be on it:
Microdrives and associated port
PAL encoder and TV modulator
8301 and old 128K of RAM
1 Joystick connector (the one that simulates function key presses)
Flashing in Mode 8 screens

Things that will change:
ROM port is going to use a 34 pin header, similar to the floppy connector, with additional lines
BT style RS 232 connectors are going to be replaced by 10-way headers, compatible with PC style 10-way to D-9 adapters
Membrane connector will be replaced by 20-way header
Remaining Joystick connector will be replaced by a 10-pin header (which can be routed to a standard 9-pin connector same as RS 232), and will be fully isolated from the keyboard, so auto-fire joysticks and Atari-style mouses can be directly connected.

Things that will not be changed:
ZX 8302 and IPC will stay the same meaning serial ports and network will be exactly the same
Hermes/Super Hermes, Falkenberg & Di-Ren Keyboard interfaces will of course be supported.

Things that will be added:
Completely new graphics hardware
Possibility of 5-Volt operation with Qplane
Some provisions to enable the really daring to fit it into the QL housing (with SGC, Qubide, 2.5" hard drive and 3.5" floppy, perhaps!).

Things that have not been decided on:
Palette for graphics
Additional 10-pin header wired as Ser2 receive only (for Serial Mouse)
Only one ROM socket (configurable for old ROMs or EPROM, possibility of larger capacity)

Graphics Specs:

The Graphics hardware will be compatible with the current, except that flashing in Mode 8 is not supported, and it will be slightly faster (30%).

The hardware can be configured to use 4 types of monitors QL style, VGA, SVGA, and midrange performance multisynch (horizontal frequency up to 48 kHz).

If a SGC is used, all but the last 16K of it's IO address area (which is kept free for

Qubide) will be used up for the graphics card which will then have more capability.

In addition to mode 4 and 8 there will be a mode 16 and mode 256; mode 16 will display 16 colours and mode 256 will display 256 colours on a monitor with analogue inputs.
There will also be more resolutions to choose from, 8 in total: 512 x 256, 512 x 384, 640 x 320, 640 x 480, 768 x 384, 768 x 576, 1024 x 512, & 1024 x 768. All resolutions are NOT available on all monitors and in all modes. If a resolution is chosen which cannot be displayed by the hardware or on the monitor used, the maximum possible resolution will be displayed that can fit the available hardware. As a result of this, other resolutions may be generated depending on the circumstances.

The maximum limits of the graphics card are 1024 x 768 in mode 4 (mode 8 is also supported and halves the number of horizontal pixels with respect to mode 4, just like the current hardware), 1024 x 480 in mode 16 and 512 x 480 in mode 256.

Most of the resolutions will be accurately displayed on all the monitor types, a notable exception being 1024 x 768, which will be displayed as 1024 x 576 on a QL and VGA monitor.
Please note that the picture will NOT be of the same quality on all monitors, especially in higher resolutions. The best possible quality will of course be achieved using a multisynch monitor.

If a program writes directly to the old screen addresses, the old screen will appear as a 512 x 256 window in the top left-hand corner of a higher resolution screen, but ONLY if the system is running in mode 4 or 8, regardless of the resolution. Again for anything over the standard mode 4 and 8, a SuperGoldCard is a requirement.

The following will of course be places where you will be able to obtain one of these new cards when they hit the market. This is in many ways a leap ahead for the QL, so stay in touch with one of these dealers if you want to get an Aurora Card for your QL. This should soon be followed by a new Super Gold Card 2 from the same people. E.D.

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38 Brunwin Road
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Thought you might enjoy...Don Walterman

DOS Beer: (das bier?. . .)

Requires you to use your own can opener, and requires you to read the directions carefully, before opening the can. Originally, only came in an 8-oz can, but now comes in a 16-oz can. However, the can is divided into eight compartments of 2-oz each, which have to be accessed separately. Soon to be discontinued, although a lot of people are going to keep drinking it after it's no longer available.

MAC Beer:

At first, came only in a 16-oz can, but now comes in a 32-oz can. Considered by many to be a light beer. All the cans look identical. When you take one from the fridge, it opens itself. The ingredients list is not on the can. If you call to ask about the ingredients, you are told that "you don't need to know". A notice on the side reminds you to drag your empties to the trash can.

WINDOWS 3.1 Beer:

The worlds most popular beer. Comes in a 16-oz can that looks a lot like MAC Beer's. Requires that you already own a DOS Beer. Claims that it allows you to drink several DOS Beers simultaneously, but in reality you can only drink a few of them, very slowly, especially slowly if you are drinking the WINDOWS Beer at the same time. Sometimes, for no apparent reason, a can of WINDOWS Beer will explode when you open it.

OS/2 Beer:

Comes in a 32-oz can. Does allow you to drink several DOS Beers simultaneously. Allows you to drink WINDOWS 3.1 Beer simultaneously too, but somewhat slower. Advertises that its cans will not explode when you open them, even if you shake them up. You never really see anyone drinking OS/2 Beer, but the manufacturer (International Beer Manufacturer) claims that over 9 Million six-packs have been sold.

WINDOWS 95 Beer:

The newest beer on the market. A lot of people have taste tested it and claim it's wonderful. The can looks like MAC Beer's can, but it tastes like WINDOWS 3.1 Beer. It comes in 32-oz cans, but when you look inside, the cans only have 16 oz of beer in them. Most people will probably keep drinking WINDOWS 3.1 Beer, until their friends try WINDOWS 95 Beer and say they like it. The ingredients list, when you look at the small print, has some of the same ingredients that come in DOS Beer and MAC Beer, even though the manufacturer claims that this is an entirely new brew.

WINDOWS NT Beer:

Comes in 32-oz cans, but you can only buy it by the truckload. This causes most people to go out and buy bigger refrigerators. The can looks just like WINDOWS 3.1 Beer's, but the company promises to change the can to look like WINDOWS 95 Beer's after WINDOWS 95 Beer starts shipping well. Touted as an industrial strength beer, and suggested only for use in bars.

UNIX Beer:

Comes in several different brands, in cans ranging from 8-oz to 64-oz. Drinkers on UNIX Beer display a fierce brand loyalty, even though they claim that all the different brands taste almost identical. Sometimes the pop-tops break off when you try to open them, so you have to have your own can opener around for these occasions, in which case you either need a complete set of instructions, or a friend who has been drinking UNIX Beer for several years.

QDOS Beer:

An innovative British micro-brewery beer, first released to great acclaim around 1984. It was, for reasons best left unsaid, soon sold off to a competing distributor, who took QDOS Beer off the market so as not to dilute the tepid sales of his own inferior house brand. Packaged in a

32-oz can, it curiously has only an 8-oz opening, but by using straws, almost three cases may be drunk simultaneously. Recently, attachments have become available to enlarge the opening to a full 32-oz, but the brew remains drab in color and lacking in carbonation. Since its hostile takeover in the mid 1980's, production has gone underground, preserved throughout Europe in tiny, but enthusiastic cell(ar)s which, despite a diminishing demand, continue to produce an ever improving product. Those who have been drinking QDOS Beer for years, claim that what it may lack in color and fizz, it more than makes up for in personality and strength. Noted for its ease of opening and easy consumption, it remains, to its loyal consumers, an often overlooked, but classic recipe that was marketed ahead of its time. See also QDOS ICE Beer.

AMIGA DOS Beer:

The company has gone out of business, but their recipe has been picked up by some weird German company, so now this beer will be an import. This beer never really sold very well, because the original manufacturer didn't understand marketing. Like UNIX Beer, AMIGA DOS Beer fans are an extremely loyal and loud group. It originally came in a 16-oz can, but now comes in 32-oz cans too. When this can was originally introduced, it appeared flashy and colourful, but the design hasn't changed much over the years, and appears dated now. Critics of this beer claim it is only meant for watching TV anyway.

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QL Troubleshooting by Tony Firshman (21 Dec 93)

If you get a complete screen failure, but power light is on and you are using Gold Card, replace the 8301. Do NOT use the qpower switch mode regulator with Gold Card (I do not recommend the use of this without GC either!!)

Check with Miracle that you have the GC mods up to date.

Remove all upgrades, ROMs etc and see if fault still there.

RAM failures - use MINERVA. This will flag the FIRST faulty address in RAM, and the relevant chip can be replaced. In fact the QL std memory test will NOT pick up RAM errors where NUL bits are written. Minerva will eventually as the memory test write data is varied.

Check that your Sinclair is to latest build spec. (D14+ or has flying leads over IC23-XZ8302). If not then `2 will secure a circuit diagram and list of mods from me. Check and clean all mains connections - especially on QL power supply and mains plug (including fuse holder and screw terminals). Power socket on QL often has dry solder joints - especially if QL is used with case OFF! Don't route mains cables anywhere near printer and disc drive cables.

Try using QL in different room/ house with and without any accessories, and with /without different monitor. If problem still there with and without cleaner then problem probably not mains interference.

Remove keyboard ribbon cables and clean cable ends & socket. If cable ends damaged and is not old type (non straight signal lines) cut off .5 cm from ends. If QL locks up (but an on-screen clock still runs) or few keys do not work this may be the cause. (To open QL case remove front 4 and back 4 screws. Do NOT undo the 2 screws under the microdrives).

Check 5v line (centre and LH pins of main regulator with large heat sink viewed from front of QL) Renew main 7805 regulator if voltage lower than say 4.8v. Smear base with silicon grease, and solder 10n capacitor direct to RH & centre pins (input) as viewed from front of QL. Make sure retaining screw is tight and that whole heat sink gets hot. 78S05 2A regulator can be used, but hardly seems worth it, and it makes no difference to expansions. Qpower switch mode regulator produces RF interference, and again doesn't help expansions.

Take out all socketed ICs, external ROM etc, clean legs and sockets with spray cleaner and replace, pushing down hard. Take static precautions. Similarily, clean ROM socket and ROM cartridge edge connector(latter with a rubber on the solder tracks). This is VERY often a cause of crashing on my machines. Why on earth didn't they use gold plated connector.

Thorn-EMI suggest replacing all ICs 18/23/24/34!! This is a bit drastic but if you can lay yours hands on a second working QL it is worth swapping ALL the socketed IC's and then replacing one by one (take antistatic precautions).

Use higher capacity power supply (needs 9v DC and 16v AC) unless hardwired to board. Be SURE you know what you are doing.

I always switch on all equipment with one switch where possible. Some monitors (esp Microvitek) can cause troubles if leads are removed, maybe due to floating earths causing voltage difference and blowing 8301.

If using expansions, make sure connector pins are straight. Tony Price also recommends using a SMALL sliver of wood and cleaning expansion socket with contact cleaner.

Run thickish wire from 5v line (LH pin of regulator) to ram 5v rail (Thick circuit track running from just above R68 and under IC7).

SERIAL PORTS. If -12v and +12v lines OK, then problem usually lack of outgoing RS232. Try the 2x33k -12v pull up to 19/21 of 8302. Illogical I know but it DOES cure the problem very often. Similarily open network sockets (centre pin not making contact when plug removed) have been known to affect serial ports. These must be some internal effects in the 8302. Failing

this, remove IC25 (1488) and replace in socket. I remove using specialist hot air gun, but Black & Decker electric paint stripper used CAREFULLY will work. Direct AWAY from plastic parts and don't overheat. Lever off IC ONLY when solder is fully melted. Then try different combinations of 8302/1488. I find some 8302s output less than 2v to pin 2 of 1488 - should be 2.5 or so I am told.

Note on issue 6 boards the HAL should be socketed and swapped as well. The incoming data is buffered via this (in place of IC27 on issue 5 boards). YES - the official circuit diagram IS wrong! Try the 'bombproofing' mods listed in QL World in Nov 89.

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MICRODRIVE CARTRIDGES - Five (used and new mix of) microdrive cartridges for only $5 and this includes the postage.

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QL POWER SUPPLIES - Get a backup or replacement for $16 while they are still available. These are 110 volt. The supply is limited.

FLP/RAM LEVEL 2 REPLACEMENT EPROM FOR SANDY SuperQBoards - Works with or without the mouse from Version 1.17 onwards. New manual and you get real Gold Card compatible subdirectories, greatly increased disk access time, a new ATR device that lets you access IBM/ATARI disks, and a greatly improved TK2. Priced at $36.

QL TECHNICAL MANUAL - $9 ***QL SERVICE MANUAL*** - $9 or both for only $16 postage included.

ARCHIVE MADE EASY - A new book by Bill Cable that contains the complete UPDATE ARCHIVE SERIES!, from part one to twenty-five. This is probably the best ARCHIVE source ever produced for the QL. It comes with a disk of the ARCHIVE examples discussed. $25 to anywhere in the world.

MECHANICAL AFFINITY CLIPART SET - The QL worlds largest clipart set, compressed on ten 720K or five 1.44 disks for only $38.

MINI GRAPHICS PRINTER - This program will take clipart screens, load them and print them in miniature form on a sheet of paper with files names under the picture as an option. This helps you to easily catalog all of your clipart. $25 is the price.

SUPER HERMES - All of the features of HERMES, plus IBM/AT compatible Keyboard Interface, high speed RS232 (SER3) from 1200 upto 38400, three low speed RS232 inputs (serial mouse, RTTY, etc), and 1.5K user data storable in EPROM, and a lot more. It has a full cable set and only $157. Regular Hermes is now $38.

SMSQ/E - The newest and most extensive operating system ever for the QL. Has Pointer Environment, SBASIC, and Tool Kit 2 built in. Three versions available: QL, QXL, Atari-QL Emulator. Price $147 each.

QPLANE - The Powered Back Plane for the QL is in stock. It utilizes a PC Power Supply Unit to help you place your QL motherboard, drive interface, Qubide, etc. inside a PC tower case or full sized desk top case. Add a Super Hermes, Falkenberg Keyboard Interface, or one of our new Di-Ren Keyboard Interfaces plus an IBM style keyboard and it is set to go. Qplane price $52.

MORE ON LARKEN MAXCOM by David Lassov

Dear Frank,

We have completed work on breaking out Larken Maxcom into manageable pieces for the Timex-Sinclair 2068 computer. In so doing memory was found for some additional features and processing speed was enhanced.

We discuss three different areas here: features gained and lost, a change in CODE for remote character input, and future prospects.

We break Maxcom out into two versions, both with Dallas Smartwatch and without Dallas Smartwatch (four versions in all).

Features GAINED and LOST

MaxCOM.BX does not use the clock and implements remote input, BBS MODE Additional features beyond Larry's product include QUICKLOAD, BACKUP, LINE EDITOR, SWITCH MESSAGE BASE (at Larry's suggestion), expanded STATUS list, online users' choice of four message bases, and lots of HELP FILES.

QUICKLOAD changes operating mode from MENU to BBS, while LOADing the GENERAL MESSAGES message base. BACKUP SAVE's program and variables to the current disk and reLOADs. QUIT performs a LARKEN NEW operation on the RAMdisk by replacing MaxCOM.BX with the AUTOSTART file while on channel 4. The LINE EDITOR is an amendment to the WRITE MESSAGE facility of the remote BBS. It is required by the half duplexity of the WRITEs. The ability to switch to arbitrary MBs is available only to the SYSOP, since it accesses the system drive. Users already have a choice of four such MBs as well as many HELP FILES.

MaxCOM.BT does the same as MaxCOM.BX with the addition of access to the DALLAS SmartWatch. We get time on, time off, elapsed time, current times, all expressed in the STATUS reports and the stamping of remote message receipt.

TERMax.BX adds some features to Larry's product such as QUICKLOAD, SQUEEZE Message Base, BACKUP, QUIT, ZAP remote messages, VIEW FILE, and LINE EDITOR...all amended to message entry.

QUICKLOAD goes from MENU mode to Message Menu, while LOADing the GENERAL MESSAGES Message Base. First SQUEEZE does a CAT of the system disk and then regains message slots by moving active messages to occupy ZAPped message slots and freeing up their former locations for new messages. Progress is monitored by timely LISTs and STOPs before proceeding with a CONTinue. You don't want to lose anybody's information now, do you? On the other hand any message can be VIEWed and ZAPped here also. Arbitrary ASCII files also can be VIEWed in either 32 or 64 columns.

TERMax.BT does the same as TERMax.BX with the addition of the ability to READ the time stamps of messages plus some timing of its own.

Neither MaxCOM.BX nor MaxCOM.BT implements a CAPTURE buffer. There are no AUTODIAL facilities either. Thus TERM mode (local access) is a little bit limited. There is of course less FREE RAM in any of these versions of LARKEN Maxcom due to the addition of so many features. And last, duplexity has been reduced from FULL to HALF in the remote messaging system. The loss of FULL duplexity in trying to speed up LARKEN Maxcom is what makes the LINE EDITOR mandatory. For with Larry's version, what you see is what you get...but now what you see is what you requested. If you want to see what I get then you have to go to EDIT.

With both versions of TERMax we lose BBS mode and remote messaging thus freeing up loggin and commands sections for SQUEEZE, etc. Bottom line is we have less FREE RAM than with Larry's product

The BIG CHANGE in coding philosophy for remote messaging is one use of INPUT#7 for a message line rather than as many as eighty uses of INKEY$#7 for the same message line. Larry complimented us on the slow performance of the latter with FULL duplex, but Don Walterman's use of the line editor convinced us to go with the former and the HALF duplex I mean that INKEYS#7 with Full Duplex is slow and gives immediate feedback on the integrity of the last character ENTERed. But INPUT#7 with the Half Duplex is FAST and the integrity of ALL the lines ENTERed can be confirmed by POST-EDIT, a more satisfactory solution all around (except in the case of cheap-skates who don't care what OUR version of THEIR message looks like!!)

So now message entry is RAPID and ACCURATE, subject only to a very minor irregularity in WORDWRAP, which does not even show up in the received messages! *EDITORS NOTE: Several people have told me that it does show up though for the person calling into the BBS*

PROSPECTS

Our main interest in engineering is MODELING and SIMULATION. We have developed our own simulation language, Systems-Oriented Language, and we got into messaging only as a way of sending SOL over the phone. We have found that phone connections are conserved, even after performing a LOAD and a SAVE, at least they are under SOL BBS. And we are anxious to report on the results of our continued attempts to SEND SOL. I think we will need to send graphics though. We will let you know in the pages of UPDATE magazine!!

EDITORS NOTE: Perhaps we will hear more on this subject, as I have said before I will experiment with the idea of doing an Internet Electronic Version of UPDATE magazine as an experiment to see how that works out. If you have email access via the Internet, Compuserve or America On Line and want to participate in this experiment, let me know. It will be made available in a plain text mode as well as an html mode, with all graphics available in GIF format so they can be read by QL, TS2068, IBM, MAC and Amiga computers. This means most of you with at least a terminal program should be able to read it. In the meantime look for further news from David Lassov in the pages of the TSNUG newsletter, soon to become a full quarterly magazine. Most of you should soon get a chance to subscribe to membership in TSNUG including the magazine.

One other note to David and our readers. David has been working on a lot of changes to some of Bill Jones' word processor and database programs. I now give him full permission to go ahead and make these available to the public TS2068 user. It is necessary to encourage any innovation we can get for the TS2068 in order to give it a future. I am also releasing to Public Domain all of the programs of the Widjup Company (BILL PEDERSEN) who when he passed away left all of his intellectual material to UPDATE Magazine. I want to see this stuff widely made available to the users of the TS2068 and the Spectrum. I hope to post most or all of this material to places like my Internet Web Site and to QBOX BBS so that it can be downloaded for your use. Perhaps TSNUG will be able to make some of it available in their library for your use. I do not want to get into supplying the disks and documentation to individual users as I do not have the free time to do this.

The Editor of UPDATE Magazine for the last six years wishes all of you the best in the future.

Frank W. Davis

JS HEN MER SOFTWARE

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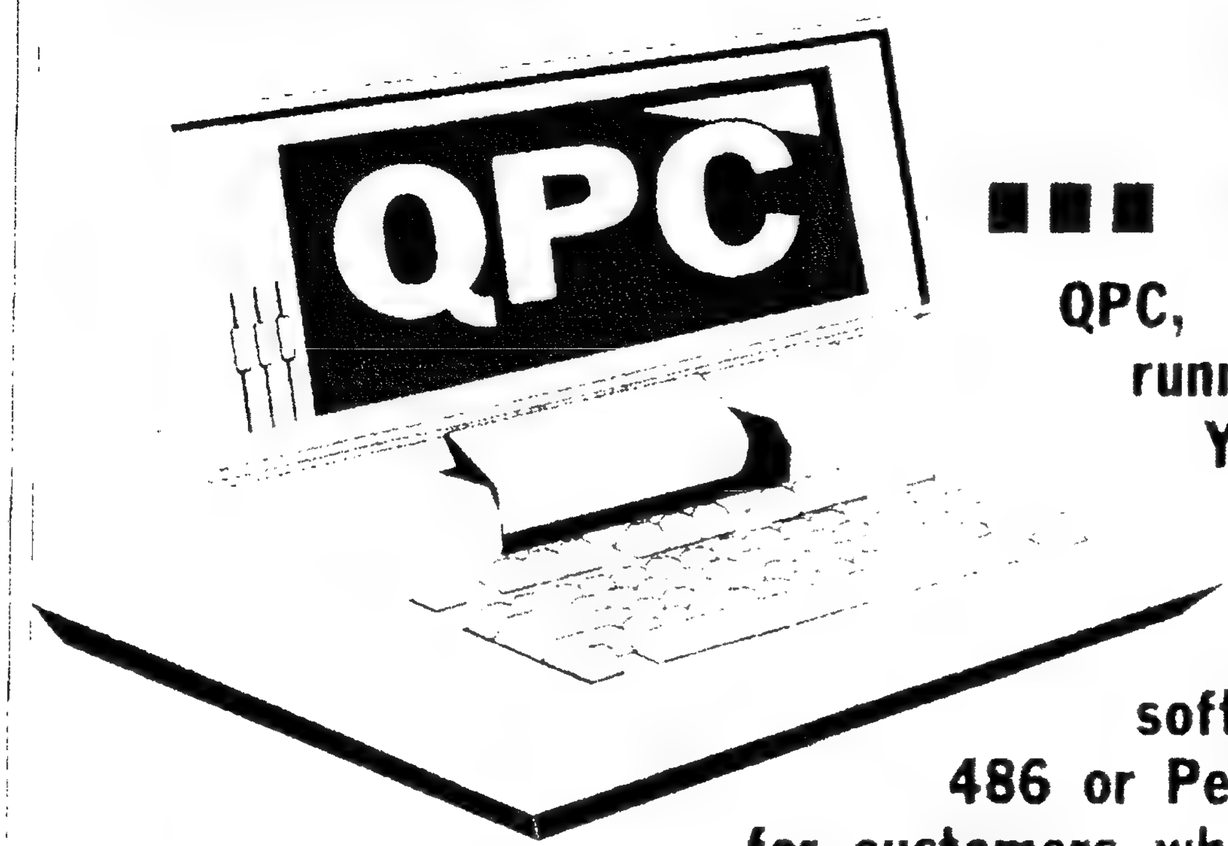

... is here!

QPC, the brandnew QL-Emulator running SMSQ/E is ready now! You can now run SMSQ/E on PC's and even Laptops without extra emulator hardware - it is emulated in software! Minimum requirement: 486 or Pentium. The price is DM 199,- for customers who already own SMSQ/E for other systems, otherwise it will be DM 249,-. You can order NOW!!!

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I/O 2 Toolkit	[V2.15]	DM 99,-

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Sir Clive Sinclair has sent the following letter (extracts):

Dear Mr.Tedeschi,
... I would like to say how astonishing I found your book. It is so remarkably complete and will be a great help to me ...
Best wishes
Sir Clive Sinclair

Internal Memory Expansion for the Z88

I've always wanted to add memory to the Z88. I got started with the Z88 a bit late in its life so a lot of the products I read about were no longer available. Reading back through the old magazines, I noticed some advertisements for internal memory expansion kits. Since none of them are available anymore, I decided to make it a do it yourself project. I started with the Z88 service manual. It explains that the internal memory is pseudo-static memory. This type of memory is not common. I did manage to find one advertisement for it. The company is Microprocessors Unlimited. They stock both 128k and 512k pseudo-static memory thats perfect for the Z88. The prices are $9.95 for the 128k memory and $27 to $30 for the 512k memory. Back to the service manual, It also explains the memory socket is pinned for the 128k memory chip. The only problem is every Z88 board I've looked at has the memory chip soldered in. Some of you may be lucky enough to have a socketed chip, but don't expect it. Carefully unsolder the old memory chip and install a low profile socket. Make sure to use a 32 pin socket. You will need to clean out the extra 4 holes above the 32k ram which only uses 28 pins. I tried the 128k chip first. It worked right away. The Z88 recognized it without doing anything special. I installed the 512k chip and it only saw the first 128k. Back to the service manual. The service manual explains the Z88 is designed to access four blocks of one megabyte each. To access the full one megabyte, you need to use all the memory address lines. Memory address lines 17 and 18 don't go to the internal ram socket. They do go to each of the option card connectors. It happens that there are three pads by each connector. Use the two pads next to each other that go to the second and third pin from the end of the connector. These pads are memory address lines 17 and 18. They are perfect for this project. Solder a wire to each pad on the foil side of the board. Make sure your wire doesn't go through the pad too far. There is a metal bar that too long a wire could short against. There are a number feed thru holes on the each side of the internal ram chip. I prefer the feed through hole by pin 3 of the memory chip and the feed through by pin 18 of the memory chip. This allows you to run the wire right to the pins you want. Don't solder the wire to the feed through holes. Just run the insulated wire through it. Feed one of the wires through each feed hole. Don't use too much wire. You want to make sure none of the wire interferes with the option slots. I left pins 1 and 30 bent out of the socket so that it would be easy to solder the extra memory lines on. After attaching the two memory lines, the Z88 woke up with 512k. It recognized all of it. One last detail. the clearance under the keyboard is tight. When I put the Z88 back together, I noticed the keyboard bent a little. Then I looked at the bottom of the keyboard, I saw that there was a clear space above the Z88 rom. Use a sharp pair of wire cutters to trim the area on the bottom of the keyboard above the ram just like it is over the rom. Now the keyboard fits well. This is why its better to use a low profile socket if you have one. Enjoy this simple do it yourself project. The only hard part is unsoldering the old ram chip. Be careful and you'll be successfull. If you aren't good at soldering, please ask someone that is. This is a great way to cheaply upgrade your Z88.

A few notes: Make sure to completely back up your Z88 before starting this project. Zback works great for a full backup. You will probably need to do a hard reset to get the Z88 to check to see how much memory is now installed. Don't be surprised if the Z88 makes a strange noise the first time you turn it on. Just perform a hard reset and it will be fine after that. I didn't have time to make a fancy drawing of how to do this. I've included a basic diagram that should help. My next project is to add two 512k ram chips to an option slot. It should be possible to make a one megabyte board for about $60. The connector is a challenge though.

Microprocesors Unlimited (918) 267-4961

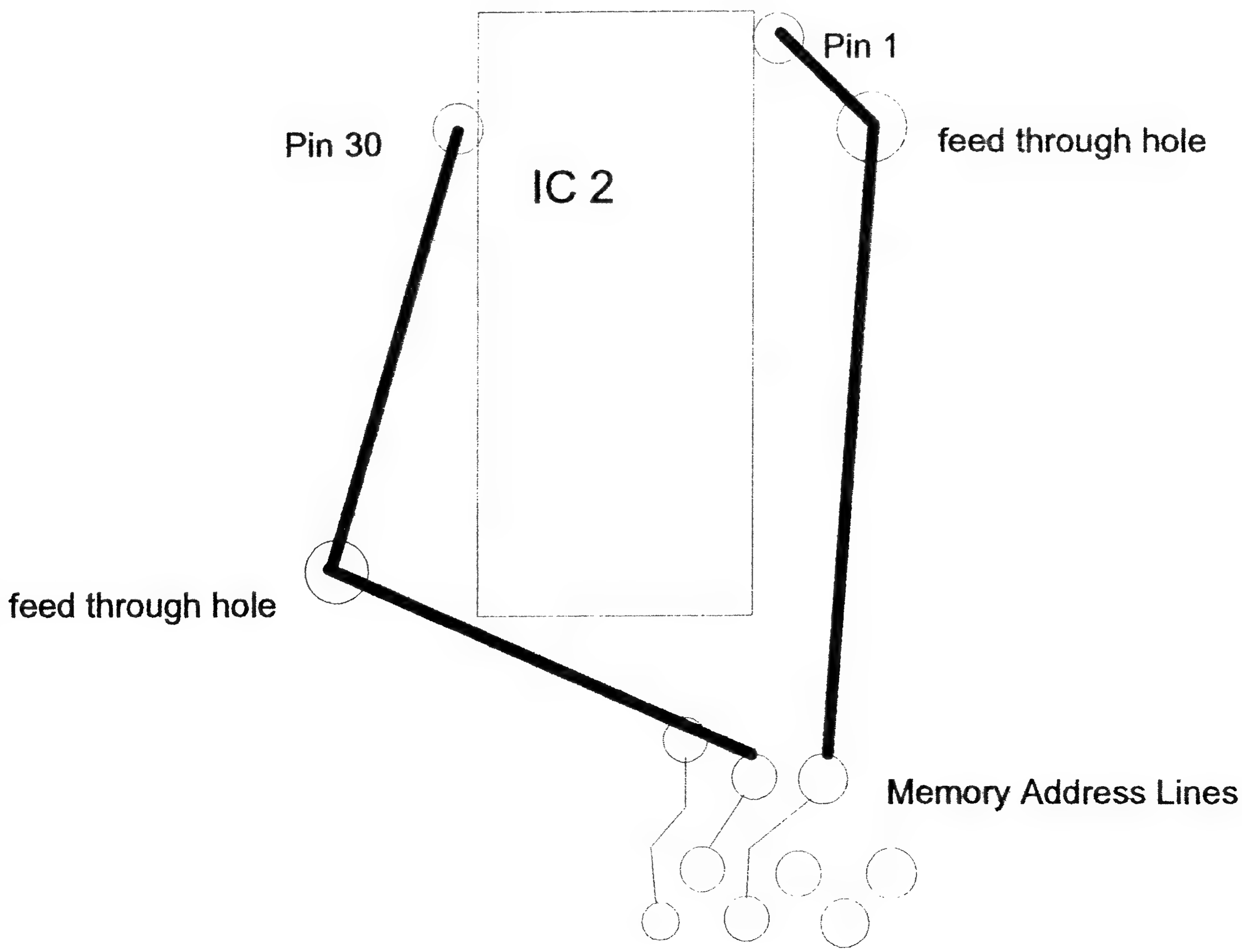
128k pseudo-static ram	Hitachi	HM658128ALP	$9.95
512k pseudo-static ram	Hitachi	HM658512LP	$27.00-$30.00

(Either speed 80 or 100 ns should work fine)

Don Walterman
331 Drace
Rochester, MI 48307

Z88 Memory Upgrade

(viewed from bottom of board)



EPSON.PED

PAGE-1		ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1	UNDERLINE	27,45,1	27,45,0	Y
2	BOLD	27,69	27,70	Y
3	EXT SEQ			Y
4	ITALICS	27,52	27,53	Y
5	SUBSCRIPT	27,83,1	27,84	Y
6	SUPERSCRIPT	27,83,0	27,84	Y
7	CONDENSED	15	18	N
8	USER DEF	27,120,1	27,120,0	N

PAGE-2	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,64			
PRINTER OFF		163		
END OF PAGE	12	27,82,3,35,27,82,0		
LINE FEED	YES			
HMI:				
PREFIX				
SUFFIX				
OFFSET				

ELITE-A.PED

PAGE-1		ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1	UNDERLINE	27,45,1	27,45,0	Y
2	BOLD	27,69	27,70	N
3	EXT SEQ	27,71	27,71	N
4	ITALICS	27,52	27,53	N
5	SUBSCRIPT	27,83,1	27,84	Y
6	SUPERSCRIPT	27,83,0	27,84	Y
7	CONDENSED	15	18	N
8	USER DEF	27,87,1	27,87,0	N

PAGE-2	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	91	123
END OF PAGE	12	27,58	5	3
LINE FEED	YES	35	93	125
HMI:		223	6	4
PREFIX		126	160	92
SUFFIX		254	95	39
OFFSET				

CLI.PED

PAGE-1		ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1	UNDERLINE	27,45,1	27,45,0	Y
2	BOLD	27,69	27,70	N
3	EXT SEQ	27,88,5,99,27,71		N
4	ITALICS	27,52	27,53	N
5	SUBSCRIPT	27,83,1	27,84	Y
6	SUPERSCRIPT	27,83,0	27,84	Y
7	CONDENSED	15	18	N
8	USER DEF	27,87,1	27,87,0	N

PAGE-2	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	96	124
END OF PAGE	12	27,58	228	221
LINE FEED	YES	92		125
HMI:		223		4
PREFIX		94	160	
SUFFIX		254	95	
OFFSET				

BOXES-CENTS.PED

PAGE-1		ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1	UNDERLINE	27,45,1	27,45,0	Y
2	BOLD	27,69	27,70	N
3	EXT SEQ	27,71	27,71	N
4	ITALICS	27,52	27,53	Y
5	SUBSCRIPT	27,83,1	27,84	Y
6	SUPERSCRIPT	27,83,0	27,84	Y
7	CONDENSED	15	18	N
8	USER DEF	27,87,1	27,87,0	N

PAGE-2	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		35	93	126
END OF PAGE	12	223	4	155
LINE FEED	YES	64	95	94
HMI:		218	196	197
PREFIX		60	124	62
SUFFIX		192	179	217
OFFSET				

MONITOR.PED

OFF STRING FOR EXT SEQ = 27,88,12,76

PAGE-1		ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1	UNDERLINE	27,45,1	27,45,0	Y
2	BOLD	27,69	27,70	N
3	EXT SEQ	27,88,12,76,27,69 (ON)		N
4	ITALICS	27,52	27,53	N
5	SUBSCRIPT	27,83,1	27,84	Y
6	SUPERSCRIPT	27,83,0	27,84	Y
7	CONDENSED	15	18	N
8	USER DEF	27,87,1	27,87,0	N

PAGE-2	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	124	
END OF PAGE	12	27,58	221	
LINE FEED	YES	92		125
HMI:		223		4
PREFIX		94	160	
SUFFIX		254	95	
OFFSET				

SPS.PED

PLEASE TAGI

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ			N
4 ITALICS	27,52	27,53	N
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A .	B .	C .
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	35	.....	125
HMI:		223	.....	4
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET				

STAMPS.PED

▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A	B .	C .
PRINTER ON	27,54			
PRINTER OFF		35	37	126
END OF PAGE	12	223	171	155
LINE FEED	YES	64	95	94
HMI:		218	196	191
PREFIX		60	124	62
SUFFIX		192	179	217
OFFSET				

M-TALLY.PED

27,40,115,=QQ

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDL 27,38	,100,49,68	27,38,100,64	Y
2 BOLD	QQ,51,66	QQ,48,66	N
3 EXT SEQ			N
4 ITALICS	QQ,49,83	QQ,48,83	N
5 SUBSCRIPT	QQ,45,49,85	QQ,48,85	Y
6 SUPERSCRIPT	QQ,43,49,85	QQ,48,85	Y
7 CONDENSED	15	18	N
8 USER DEF	14	20	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A .	B .	C .
PRINTER ON	27,69			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

CANON-200.PED

27,40,115,=QQ

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDL 27,38	,100,49,68	27,38,100,64	Y
2 BOLD	QQ,51,66	QQ,48,66	N
3 EXT SEQ			N
4 ITALICS	QQ,49,83	QQ,48,83	N
5 SUBSCRIPT	QQ,45,49,85	QQ,48,85	Y
6 SUPERSCRIPT	QQ,43,49,85	QQ,48,85	Y
7 CONDENSED	15	18	N
8 USER DEF	14	20	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A .	B .	C .
PRINTER ON	27,69			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

CANON-230.PED

27,40,115,=QQ

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDL 27,38	,100,49,68	27,38,100,64	Y
2 BOLD	QQ,51,66	QQ,48,66	N
3 EXT SEQ			N
4 ITALICS	QQ,49,83	QQ,48,83	N
5 SUBSCRIPT	QQ,45,49,85	QQ,48,85	Y
6 SUPERSCRIPT	QQ,43,49,85	QQ,48,85	Y
7 CONDENSED	15	18	N
8 USER DEF	14	20	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A .	B .	C .
PRINTER ON	27,69			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

USER-DEF-1.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,109,4	27,109,0	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	91	123
END OF PAGE	12	27,58	5	3
LINE FEED	YES	64	93	125
HMI:		223	6	4
PREFIX		37	....	.....
SUFFIX		145	.....	.....
OFFSET		.....	.....	.....

ELITE-MM.PED

EXT.SEQ. MAX.MARGIN+ELITE CHRS. = 96

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,58,27,88,6,90		N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	91	123
END OF PAGE	12	27,58	5	3
LINE FEED	YES	64	93	125
HMI:		223	6	4
PREFIX		.....	....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

GRAPHICS.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		32	33	34
END OF PAGE	12	219	220	221
LINE FEED	YES	35	36	37
HMI:		176	223	222
PREFIX		38	39	40
SUFFIX		32	177	178
OFFSET		.....	.....	.....

BANNER.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	124	38
END OF PAGE	12	27,58	220	221
LINE FEED	YES	35	37	94
HMI:		219	223	222
PREFIX		38	39	40
SUFFIX		32	177	178
OFFSET		.....	.....	.....

CHR-SET.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,82,3,35,27,82,0		
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

BACK-SPACE.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮

	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

COND-MM.PED

EXT.SEQ. MAX.MARGIN + CONDENSED CHRS = 137

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	15,27,88,7,130		N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮

	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

ADR-PED.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮

	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	91	123
END OF PAGE	12	27,58	5	3
LINE FEED	YES	92	93	125
HMI:		223	6	4
PREFIX		126	....	.....
SUFFIX		254.	.....	.....
OFFSET				

SLOT.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71		N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮

	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	96	.....	.....
HMI:		223.	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

RULED-LINES.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71		N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮

	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	93	126
END OF PAGE	12	27,58	4	62
LINE FEED	YES	64	95	94
HMI:		218	196	191
PREFIX		60	124	62
SUFFIX		192	179	217.
OFFSET		.....	.....	.....

ADV.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	N
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	96	....
END OF PAGE	12	156	221	.....
LINE FEED	YES	92	.....	125
HMI:		223.	.....	4
PREFIX		.....	160	.....
SUFFIX		.....	95	.....
OFFSET				

BOXES-ARO.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	15,27,88,7,130		N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		35	93	160
END OF PAGE	12	223	4	62
LINE FEED	YES	64	95	94
HMI:		218	196	191
PREFIX		60	124	62
SUFFIX		192	179	217
OFFSET				

CLI-1.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	96	.....
END OF PAGE	12	27,58	228	.....
LINE FEED	YES	92	.....	125
HMI:		223	.....	4
PREFIX		94	160	.....
SUFFIX		254	95	....
OFFSET				

BASIC.PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,88,5,135,	27,71,15	N
4 ITALICS	27,52	27,53	N
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS A.	B.	C.
PRINTER ON	27,54			
PRINTER OFF		163	96	.....
END OF PAGE	12	27,58	228	.....
LINE FEED	YES	92	.....	125
HMI:		223	.....	4
PREFIX		.....	160	.....
SUFFIX		.....	95	.....
OFFSET				

. . . . . PED

▮▮▮▮ PAGE-1 ▮▮▮▮	ON STRING CODES.....	OFF STRING CODES.....	CAR. RET.
1 UNDERLINE	27,45,1	27,45,0	Y
2 BOLD	27,69	27,70	N
3 EXT SEQ	27,71	27,71	N
4 ITALICS	27,52	27,53	Y
5 SUBSCRIPT	27,83,1	27,84	Y
6 SUPERSCRIPT	27,83,0	27,84	Y
7 CONDENSED	15	18	N
8 USER DEF	27,87,1	27,87,0	N

▮▮▮▮ PAGE-2 ▮▮▮▮	CODES	TRANSLATIONS		
PRINTER ON	27,54			
PRINTER OFF		163	.....	.....
END OF PAGE	12	27,58	.....	.....
LINE FEED	YES	.....	.....	.....
HMI:		.....	.....	.....
PREFIX		.....	.....	.....
SUFFIX		.....	.....	.....
OFFSET		.....	.....	.....

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